ROYAL COMMISSION ON TUBERCULOSIS (HUMAN AND BOVINE).

FINAL REPORT OF THE ROYAL COMMISSION

APPOINTED TO INQUIRE INTO THE RELATIONS OF

HUMAN AND ANIMAL TUBERCULOSIS.

PART II. APPENDIX.

VOLUME I.

Investigation of Viruses obtained from Cases of Human Tuberculosis (other than Lupus).

A. STANLEY GRIFFITH, M.D.

Presented to both Houses of Parliament by Command of His Majesty.

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PREFACE.

The reports on the experimental work performed at Blythwood Farm since October, 1907, are published in three volumes—Vols. I, II, and III.

Volumes I and II give the results of the investigation of all the cases of human tuberculosis obtained since the publication of the Second Interim Report.

Of the reports in Volume III two are of investigations carried out at Blythwood; one of these deals with further work on old viruses the investigation of which had not been completed when the Second Interim Report was published, and additional work on two of the recent viruses, the other is a report on the excretion of tubercle bacilli in the milk of animals experimentally inoculated.

In the preparation of these volumes for the printer I have had the advantage of the assistance of Mr. C. F. Fox and I have him to thank for many valuable suggestions as to the arrangement of the details and for correcting the proofs.

This volume, Volume I, records the results of the investigation of the new cases of human tuberculosis other than lupus and includes a full account of the cultural and pathogenic properties of the tubercle bacilli isolated from them.

In the first part of the volume there is given first an account of the different viruses investigated stating the type or types of bacilli isolated in each group of cases, second a comparative study of the properties, cultural and pathogenic, of the two types of tubercle bacilli isolated, and third the results of the experiments carried out to ascertain whether any of the properties of the tubercle bacilli isolated could be altered by residence in the bodies of mammals or birds.

Then follows the more detailed part of the report. This begins with a Table of Origins in which for each case, grouped according to the kind of tuberculosis, there are given a brief abstract of the clinical history and post-mortem notes of the patient and a statement as to the type of bacillus isolated. The table is followed by a fuller statement of the clinical and post-mortem notes of each patient together with summaries of the experimental results with the bacilli isolated, viruses here being arranged in numerical order.

After these come the tabular summaries of the inoculation experiments performed on the different species of animals; the experiments with each species are tabulated separately and divided into groups according to the properties of the virus.

Lastly there are the full post-mortem notes of the larger animals grouped together according to the virus used, each set of experiments being preceded by graphic charts on which appear all the animals inoculated with the virus. A series of photographs illustrating the types of growth of the cultures is appended.

The pictorial charts exhibiting the lesions produced in calves, pigs, and goats by viruses obtained from cases of human tuberculosis other than lupus are included with other similar charts in a supplementary volume.

A. STANLEY GRIFFITH,

Blythwood Farm.

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INVESTIGATION OF VIRUSES OBTAINED FROM CASES OF HUMAN TUBERCULOSIS (OTHER THAN LUPUS).

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THE INVESTIGATION OF VIRUSES OBTAINED FROM CASES OF HUMAN TUBERCULOSIS (OTHER THAN LUPUS).

INTRODUCTION.

The following report gives the results of the investigation of tubercle bacilli from 55 cases of human tuberculosis from 54 of which cultures were isolated.*

The original material consisted of tuberculous tissues (including fluids and pus) obtained after death or by operation from 25 persons, and sputum obtained from 30 persons with clinical signs of pulmonary tuberculosis; the persons were of various ages and most of the chief varieties of tuberculosis occurring in man are represented.

The cases have been divided into groups according to the mode of origin of the disease or to the situation of the lesions, and each group is separately considered.

The list includes:—

Ten cases of alimentary tuberculosis in children.
One case of alimentary tuberculosis in an adult.
Three cases of tuberculous meningitis.
Two cases of general miliary tuberculosis (origin uncertain).
Four cases of pulmonary tuberculosis.
Sputum from thirty cases of pulmonary tuberculosis.
One case of tuberculosis of the suprarenal bodies.
Three cases of tuberculosis of bones.
One case of tuberculosis of a joint.

Seven cases in which the material though apparently tuberculous did not produce tuberculosis in guinea-pigs were also investigated.
Four cases in which the milk of lactating women with clinical signs of pulmonary disease was tested for the presence of tubercle bacilli.

The nature of the tuberculosis in each case has been ascertained by the investigation of cultures isolated directly or indirectly from the tuberculous lesions. The original material was in every case inoculated into guinea-pigs for the purpose of obtaining cultures, and occasionally into rabbits to gain a preliminary idea as to the virulence of the virus.

In the cases where there were lesions in more than one organ or gland two or more strains of culture were isolated in order to ascertain whether the different lesions were produced by bacilli of the same type.

The demonstration, chiefly by German observers, of different types of tubercle bacilli within the same tuberculous lesion or in different lesions in the same patient, has made it necessary in all cases of generalised tuberculosis to isolate and determine the properties of bacilli from lesions in different parts of the body before the disease can be rightly attributed to a particular type of bacillus. The investigation of a single strain can now be regarded as establishing only the nature of the tuberculous lesion from which the strain was isolated.

Each strain isolated has been separately studied with reference to its cultural characters and virulence.

The methods employed to determine these properties are detailed on page 24 *et seq*.

RESULTS OF THE INVESTIGATION OF THE DIFFERENT GROUPS OF VIRUSES.

Primary Alimentary Tuberculosis in Children.

Ten cases of tuberculosis in children caused by bacilli which had entered the body by way of the alimentary tract have been investigated.

In seven of these the portals of entry were in the mucous membrane of the intestines, in two there was a simultaneous infection through the walls of the pharynx and small intestine, and in the remaining one the point of entry was somewhere in the pharynx.

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* As stated in the preface, these cases are additional to and include no account of those already reported on in the 2nd Interim Report.

The ages of the children varied from seven months to eight years seven months.

Two of the children died of general tuberculosis and in one of these there were tubercles on the meninges, three died of tuberculous meningitis, two of tuberculous peritonitis and one of multiple stricture of the gut (tuberculous); the remaining two died from intercurrent disorders and the tuberculous lesions were found at the post-mortem examination.

In every case in which the disease was generalised cultures were made not only from the glands nearest the presumed sites of entry of the bacilli but also from one or more of the remote lesions. The examination of a number of different strains from the same patient is specially important in the case of children because of their liability to infection with the bovine as well as with the human tubercle bacillus. In none of these cases however was there any evidence of a mixed or a double infection, the cultures derived from metastatic lesions being identical with those from the glands nearest the portal of entry of the bacilli.

The bacilli isolated from the ten cases fall readily into two groups, one containing bacilli which grow luxuriantly on artificial media and have low virulence for the rabbit, the other bacilli which grow less abundantly and have high virulence for the rabbit and calf; the members of the latter group are indistinguishable from bacilli which are the cause of bovine tuberculosis.

Bacilli with the properties of the bovine tubercle bacillus have been obtained from four of the children, all of whom died as a result of the tuberculous infection.

The first case (H. 69. "F.K.") was a girl aged two years who died of tuberculous meningitis and showed on post-mortem examination besides the meningeal tuberculosis a few small ulcers in the ileum, a single tuberculous mesenteric gland, and slight tuberculous perisplenitis.

Cultures were raised from the mesenteric gland and the meninges. The two strains were identical in their cultural characters and both were highly virulent for the calf and rabbit.

The second case (H. 77. "R.L.") was that of a boy aged 13 months who died of tuberculous peritonitis; there were ulcers in the large as well as in the small intestines, the mesenteric glands were enlarged and caseous and there were numerous tubercles on the mesentery and parietal peritoneum; there was no naked-eye evidence of tuberculosis anywhere else in the body, but a guinea-pig inoculated with an emulsion of liver tissue became tuberculous. The child was fed during the first eight months of life on cow's milk and barley water; there was no family history of tuberculosis.

Cultures isolated from the mesenteric glands direct and from the liver through the guinea-pig had the cultural characters of bovine tubercle bacilli and were highly virulent for the rabbit; the mesenteric gland strain produced fatal tuberculosis in a calf.

The third case (H. 88. "E.L.") was a girl aged $8\frac{7}{12}$ years who died from multiple stricture of the gut due to cicatrisation of tuberculous ulcers. The post-mortem examination showed about a dozen cicatrising tuberculous ulcers, the mesenteric glands were enlarged reddish and contained in the cortices fairly numerous caseous tubercles; in one bronchial gland there were two grey tubercles in one of which tubercle bacilli were found, the other used to inoculate a guinea-pig did not produce tuberculosis.

A culture obtained from a mesenteric gland grew like a bovine tubercle bacillus and was highly virulent for the calf and rabbit.

The fourth case (H. 89. "W.I.") was a boy aged four years who died of general tuberculosis; he had been breast-fed until he was fourteen months old. At the post-mortem examination extensive tuberculous ulceration of the gut was found, the mesenteric glands were enlarged and caseous, the lungs were closely beset with greyish-white caseous tubercles and there were tubercles in both kidneys.

Cultures were obtained from the mesenteric glands and the lung. They agreed in their cultural characters, growing like bovine tubercle bacilli, and both were highly virulent for the rabbit and calf.

These four cases furnish additional evidence to that brought forward in the 2nd Interim Report* that the bovine tubercle bacillus can when ingested produce severe tuberculosis in children and cause death either through extensive local changes or generalisation of the disease.

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* In the series of 20 cases of mesenteric gland tuberculosis reported on in the 2nd Interim Report 11 yielded cultures of the bovine tubercle bacillus.

The other six cases of alimentary tuberculosis in children (Viruses H. 70, H. 74, H. 75, H. 78, H. 82, and H. 83) yielded cultures which grew luxuriantly on glycerin media and had low virulence for the rabbit when inoculated subcutaneously. From two to four strains have been isolated from different lesions in each child, making altogether nineteen strains, and the cultural characters and virulence for the rabbit have in each case been determined. Five of the strains, representing three viruses, have been tested on the calf with the production in each case of no more than limited retrogressive tuberculosis.*

Two of the children, aged 7 months and 1¾ years, died of tuberculous meningitis, one aged 7 years of tuberculous peritonitis, and two aged 9 and 10 months of tuberculous meningitis and general tuberculosis; the remaining one aged 4 years died from pleurisy and pericarditis, the tuberculous lesions being found at the autopsy.

The tuberculous lesions in these children presented no naked-eye features by which they could be distinguished from lesions produced in children by bovine tubercle bacilli.

The number of bacilli in the lesions also affords no certain indication of the kind of organism responsible for the disease. The only way, therefore, of ascertaining definitely which of the two kinds of bacilli is responsible for a tuberculous lesion is to isolate cultures and determine their cultural characters and virulence.

Twenty-eight cases of alimentary tuberculosis in children under twelve years of age, in which the material was obtained after death, have now been investigated by the Commission; fourteen of these cases have been shown to be due to the bovine tubercle bacillus, and fourteen to the human tubercle bacillus.

With a view to ascertaining whether there are any differences in the extent or the severity of the disease produced by the two types of tubercle bacilli, each group of cases has been separately tabulated, the general and local extent of disease being expressed by symbols.

A comparison of the two tables (*see* page 19) reveals two important differences between the two groups of cases:—

(1) In the cases due to the human tubercle bacillus the generalised disease is more severe and widespread than in those due to the bovine tubercle bacillus; this is demonstrated by the greater number of crosses to the right of the thick line which divides local from disseminated disease in Table (*b*) than in Table (*a*), and is consistent with the child possessing something of that resistance to bovine tubercle bacilli which seemingly is not uncommon in the adult.

(2) The bronchial glands are much more frequently and more severely affected by the human tubercle bacillus than by the bovine tubercle bacillus.

A further, minor difference is the difference in average age at death. Taking only those which died of uncomplicated tuberculosis, it is found that the average age of the children which died of a human infection is 2·4 years, while that of the children which died of a bovine infection is 3·3 years.

PRIMARY ALIMENTARY TUBERCULOSIS IN AN ADULT.

One case of primary alimentary tuberculosis in an adult has been investigated (Virus H. 90. "I.P."). The patient was a man aged 70 who died of pneumonia; at the post-mortem examination caseous mesenteric and retroperitoneal glands were found and there was no sign of tuberculosis elsewhere.

Two strains of culture were obtained, one from the mesenteric glands through the guinea-pig, the other from a retroperitoneal gland direct. On artificial media the two strains exhibited identical cultural characters, producing luxuriant pigmented growths on glycerin serum, thick raised wrinkled layers on agar and potato, and moderately thick membranes on broth.

They differed however in their virulence for the rabbit. The mesenteric gland strain produced in this animal, when inoculated subcutaneously, very slight retrogressive tuberculosis. The retroperitoneal gland strain, on the other hand, produced in rabbits and calves inoculated subcutaneously general progressive tuberculosis, which was however not fatal within the period of observation. Cultures from the distal lesions in these animals were dysgonic and fully virulent.

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* Tubercle bacilli with these properties, *i.e.*, luxuriance of growth on glycerinated media and low virulence for the calf and rabbit, are throughout this report referred to as the human tubercle bacillus.

Separation experiments have since proved conclusively that the strain isolated direct from the retroperitoneal gland is a mixture of eugonic slightly virulent bacilli (Human, Group II) and dysgonic virulent bacilli (Bovine).

The details of these experiments are given in a separate Report (Appendix Vol. III, p. 18).

PULMONARY TUBERCULOSIS.

(*a*) *Material obtained after Death.*

The four cases of pulmonary tuberculosis, from which the material investigated was obtained post-mortem, include three cases of chronic ulcerative phthisis and one of tuberculo-fibroid phthisis.

The patient with tuberculo-fibroid phthisis, a man aged 24, died from multiple strictures of the small intestine following old peritonitis, ? tuberculous; the lung was fibroid and the pieces sent contained scattered dense caseous nodules of various sizes (Virus H. 79. "J.N.").

Two of the three cases of ulcerative phthisis had in addition to the lesions in the thorax calcareous nodules in the mesenteric glands, in the third the disease was confined to the thorax. The presence of old calcareous lesions in the mesenteric glands is of interest in connection with the question of the channel of infection in pulmonary tuberculosis. An emulsion made from the calcareous nodules from one of the cases (H. 81. "P.W.") did not produce tuberculosis in guinea-pigs and culture tubes sown with it remained sterile. The mesenteric gland nodules in the other case (H. 104. "E.R.") produced tuberculosis in guinea-pigs and a culture was obtained direct; this culture was identical in every respect with that obtained from the lung.

Cultures were isolated in each of the four cases from the lung direct as well as through the guinea-pig. All the strains grew luxuriantly on artificial media, and the four strains isolated from the lungs direct were shown to possess low virulence for the calf and rabbit.

(*b*) *Sputum.*

This section deals with the results of the investigation into the nature of the tubercle bacilli isolated from the sputum of persons showing clinical signs of pulmonary tuberculosis.

It was originally intended to investigate a larger number of fatal cases of *phthisis pulmonalis* but owing to the difficulty of obtaining within the time available a sufficient number of suitable cases this project was abandoned and it was decided to make use of sputum instead.

By using sputum it has been possible not only to investigate cultures from a large number of cases of pulmonary tuberculosis but also to select the cases for examination from among young persons and from persons in whom the disease was not acutely progressive. Use of material from living persons has the additional advantage that fresh samples can always be obtained for control purposes if the first cultures isolated present exceptional features.

One objection to the use of sputum is the possibility that in its passage from the lungs to the specimen jar it may get contaminated with tubercle bacilli that have been ingested with the food. Special precautions have been taken to prevent such contamination; 24 hours before the collection of the samples the teeth and gums of the patient were carefully cleansed and the mouth washed out with an antiseptic fluid; subsequently the patients were not allowed to take milk or any milk product. The sputum collected was that which was expectorated in the early morning; it was received directly into sterilized wide-mouthed bottles and was sent at once to the laboratory.

Sputum from 39 persons in all was received for investigation and in 29 of the cases cultures were isolated and tested as to their cultural characters and virulence; in another case (the 30th) no culture was obtained but the virulence of the bacilli present was determined by direct inoculation of the sputum.

In each case the sputum was inoculated intraperitoneally into two guinea-pigs and cultures were obtained from those that survived and became tuberculous.

Some of the guinea-pigs did not develop tuberculosis while others died of acute infection a few days after inoculation (nine of the cases were thus eliminated). The sputum which failed to produce tuberculosis in guinea-pigs did not show tubercle bacilli microscopically and was obtained in nearly every instance from children.

Whenever both guinea-pigs inoculated with a particular sputum lived long enough to develop tuberculosis two strains of culture were isolated from the same virus; only one of the cultures was however tested, the other was held in reserve for investigation should the first strain present any exceptional features.

In many cases rabbits as well as guinea-pigs were inoculated with the sputum, either intravenously, or intraperitoneally or subcutaneously. The majority of these animals died of an acute infection. The results in those which survived are in accord with the results of the culture inoculations (*see* page 37).

In one instance a rabbit survived the inoculation of the sputum while the guinea-pigs died of peritonitis and cultures were not obtained. The post-mortem examination of the rabbit (No. 2165) showed slight retrogressive tuberculosis. The bacilli in the sputum of this case (Virus H. 150. "C.K.") possessed therefore the virulence of a human (Group II) tubercle bacillus.

The ages of the 29 patients from whom the cultures were derived varied from 16 to 33 years with the exception of one who was 50 years old. Twenty-six of the patients were of the male sex, and three of the female sex. All the patients presented clinical signs of consolidation of one or more lobes of the lung, and in 12 of them there was evidence of cavity formation.

The cultures have been tested in the usual way, on serum and the various glycerin media to determine their cultural characters, and on rabbits to ascertain their virulence.

Twenty-seven of the twenty-nine cultures produced on the test media the luxuriant growths which are characteristic of the human tubercle bacillus.

Twenty-four of these twenty-seven cultures produced in rabbits either retrogressive tuberculosis, or slowly progressive tuberculosis not fatal within the period of observation, similar to that set up by bacilli of established low virulence for the bovine animal.

The other three cultures (Viruses H. 124, H. 129, and H. 143) gave rise in some of the rabbits inoculated to a more severe form of tuberculosis than had been produced by human tubercle bacilli.

Further experiments were made to determine whether these results were due to the presence in the cultures of a small proportion of bovine tubercle bacilli.

The virulence of each of the original cultures was retested, one calf and two rabbits being inoculated subcutaneously with each. The calves received 45, 68, and 200 milligrammes respectively, and were killed 91 to 93 days later; all showed very slight retrogressive disseminated tuberculosis of a type frequently met with after the inoculation of cultures of human tubercle bacilli (Group II); cultures recovered from these calves were eugonic. The rabbits received 10 milligrammes each, and when killed after 142 to 149 days were found to have only slight generalised tuberculosis.

Cultures recovered from seven of the first series of rabbits inoculated with the original cultures of the three viruses were tested on rabbits.

The cultures, five in number, of two of the viruses (H. 124 and H. 129) were eugonic, and proved slightly virulent for the rabbit when subcutaneously inoculated. It is clear therefore that in the original cultures of these viruses there was no admixture of bovine tubercle bacilli.

One of the two cultures from the third virus (H. 143, Rabbit 2282) was dysgonic and fully virulent for the rabbit. The other culture, from another rabbit (2285), was eugonic and slightly virulent. From a consideration of all the facts brought out by the experiments with this virus it is in my opinion more probable that the rabbit from which virulent tubercle bacilli were isolated was spontaneously infected with bovine tubercle bacilli than that bovine tubercle bacilli were present in the original culture.

Two cultures remain for consideration (H. 127. "R.R." and H. 128. "D.D."). These differed from the others both in respect to their cultural characters and their virulence; they grew like bovine tubercle bacilli on artificial media and gave rise to rapidly fatal general tuberculosis in all the rabbits inoculated.

Each of the cultures was subsequently tested on calves, and at the same time rabbits were inoculated subcutaneously. The culture from H. 127. "R.R." was inoculated subcutaneously in a dose of 50 milligrammes into a single calf, which was killed when very ill after 48 days and showed severe general tuberculosis. The culture from H. 128. "D.D." was inoculated subcutaneously into two calves, one of which received 50, the other 45 milligrammes; both calves were killed when dying of general tuberculosis in 41 and 42 days respectively. All the rabbits died of general tuberculosis.

In the case of one of the viruses, H. 127, two strains of culture had been isolated, one from each of the two guinea-pigs inoculated with the original material; the second strain, which had been preserved as a primary culture, was sub-cultivated on serum for a few generations, and was then inoculated into a calf (dose 50 milligrammes) and into a series of rabbits. The rabbits all died of general tuberculosis, but the calf resisted and was killed in good health 105 days after inoculation; the post-mortem examination showed general tuberculosis not severe and not apparently progressive. The cultural characters of the second strain were identical with those of the first.

Culture and inoculation tests thus established the complete identity with bovine tubercle bacilli of the cultures isolated from two of the sputum viruses.

Before any conclusions could be drawn as to the relation of these cultures to the pulmonary disease of the patients, it was recognised to be essential to make in each instance a fresh investigation of the sputum. The persons from whom the sputum had been obtained were both adult males, and were still under observation in institutions.

One of the patients (H. 127. "R.R.") was 21 years old, and had been a butcher's assistant. When admitted to hospital he presented signs of consolidation without cavitation at the apex of the lower lobe of the left lung. His sputum contained numerous tubercle bacilli, which were mostly of medium length and well-stained. He improved under treatment, and was discharged from hospital to a convalescent home.

The other patient (H. 128. "D.D.") was 31 years old, and presented signs of consolidation without cavitation of the whole of the upper lobe of the right lung and of the apex of the left upper lobe. This patient also improved under treatment. His sputum contained a moderate number of tubercle bacilli.

Fresh samples of sputum were obtained from each of the patients with even more rigid precautions than before against contamination with food liable to contain bovine tubercle bacilli.

From one of the patients (H. 127. "R.R.") additional specimens of sputum were collected on three separate occasions, at intervals of 76, 117, and 118 days after the collection of the first specimen; these are designated H. 127. "R.R." (*b*), — (*c*), and — (*d*) respectively. The original material (*i.e.* the sputum) of H. 127. "R.R." (*b*) produced general tuberculosis in two rabbits intravenously inoculated. Cultures were isolated from each of the three specimens through the guinea-pig, and from two of them, *i.e.* (*c*) and (*d*), directly by the aid of antiformin; altogether five strains were isolated. The cultural characters of all these strains were identical with those of H. 127. "R.R." (*a*). Two of the strains of culture from (*b*), one from (*c*) (direct), and two from (*d*) (direct and through the guinea-pig) were tested subcutaneously on rabbits, with the production of general progressive tuberculosis in all the rabbits inoculated (thirteen).

The strain obtained direct from the sputum (*c*) was inoculated subcutaneously into two calves, the dose in each case being 50 milligrammes of culture; they were killed when dying of general tuberculosis in 34 and 45 days respectively.

From the patient H. 128. "D.D." only one additional specimen was obtained; this was collected 118 days after the first specimen.

Two strains of culture were isolated, one directly by the aid of antiformin and one through the guinea-pig. The strain obtained direct was inoculated subcutaneously into two calves, the dose in each case being 50 milligrammes; both calves died of general tuberculosis, one in 37 days, the other in 46 days.

The direct strain and the strain from the guinea-pig were tested subcutaneously on rabbits; all the rabbits died of general tuberculosis.

The outcome of the additional investigation of sputum from the two patients was the isolation, in one case thrice repeated, of cultures resembling exactly the cultures originally isolated. None of the ten strains, the total number isolated from the two patients, gave any indication of the presence in them of the easy growing human tubercle bacillus.

Bovine tubercle bacilli were apparently the only tubercle bacilli present in the sputum of these two men. Both men have since died, but no *post-mortem* was allowed in either case.

BONE AND JOINT TUBERCULOSIS.

This group includes three cases of bone tuberculosis and one case of joint tuberculosis.

One of the patients with bone tuberculosis was a girl aged fourteen years who had had during her life many abscesses in connection with different bones; the culture investigated was obtained from the pus of a scapular abscess (H 67). The other two patients were males aged forty-nine and sixty-nine years and the material furnishing the cultures was pus removed in one case from a tuberculous rib (H. 72) and in the other from a tuberculous sacrum (H. 68). The tuberculous joint (H. 76) was the kneejoint of a man aged thirty years; the pulpy synovial membrane produced tuberculosis in guinea-pigs and from one of these a culture was isolated.

All these cultures had the characteristic properties, luxuriance of growth and low virulence for the rabbit, of the human tubercle bacillus (Group II); the three cultures from the cases of bone tuberculosis were shown also to possess low virulence for the calf.

TUBERCULOUS MENINGITIS.

Two cases of tuberculous meningitis in children in whom the primary seat of the disease was uncertain have been investigated (Viruses H. 98. "B.R." and H. 115. "N.G."). The ages of the children were three and seven years and in each case the original material was cerebro-spinal fluid removed during life by lumbar puncture. Microscopical examination revealed numerous tubercle bacilli in one of the samples, none in the other. Guinea-pigs inoculated with the fluid developed tuberculosis and two strains of culture were obtained in each case.

Both children died a few days after they were operated on and a post-mortem examination was permitted in one case only (Virus H. 98. "B.R."). In this the site of entry of the bacilli was uncertain; there were numerous tubercles on the meninges of the brain and cord, small tuberculous foci in the bronchial and mesenteric glands, a patch of tubercles on the surface of the spleen and no sign of tuberculosis elsewhere.

The cultures isolated from these two cases grew luxuriantly on glycerin media and one from each virus was found to possess low virulence for the rabbit.

In a third case of tuberculous meningitis (Virus H. 86. "C.P.") the primary seat of disease appeared to be in the lung and the material was obtained after the death of the patient, a boy aged 3 years 7 months.

The post-mortem examination showed a single caseous nodule in the lung, caseation of the bronchial glands and numerous minute tubercles on the meninges.

Emulsions were made from the lung nodule, the bronchial glands and the meninges and guinea-pigs inoculated with each. None of the guinea-pigs inoculated with the first two emulsions developed tuberculosis and culture tubes sown at the same time remained sterile; smear preparations from the emulsions showed tubercle bacilli. The two guinea-pigs inoculated with the emulsion from the meninges both became tuberculous and a culture was obtained from each. Both cultures grew luxuriantly on glycerin media and one was shown to be only slightly virulent for the rabbit.

GENERAL MILIARY TUBERCULOSIS.

Two cases of general miliary tuberculosis in children in which the portal of entry of the bacilli was not evident have been investigated.

The first case (Virus H. 60. "W.B.") was that of a child aged 4 years 7 months. The post-mortem examination showed numerous miliary tubercles in the lungs, liver, spleen, and kidneys, and on the meninges, pleura and peritoneum; the bronchial and abdominal glands were enlarged and extensively fibro-caseous, and there were numerous tubercles and one or two ulcers in the ileum. Cultures were raised from the meninges, lung, the mesenteric glands and a bronchial gland, in each case through the guinea-pig.

The strains derived from the meninges, lung and mesenteric glands grew luxuriantly on artificial media and had low virulence for the calf and rabbit.

The strain obtained from the bronchial gland also grew luxuriantly on artificial media but produced in calves and rabbits rapidly fatal general tuberculosis.

Direct separation experiments have shown that this particular strain is a mixture of eugonic slightly virulent bacilli and dysgonic virulent bacilli. The details of these experiments are given in a separate report. *See* Vol. III, "Certain Human Viruses of Irregular Type."

In the second case (Virus H. 93. "C.D.") the material was obtained from a child aged 2 years 3 months. At the post-mortem examination the lungs were seen to be very closely beset with confluent caseating tubercles; there were tubercles in the spleen and kidneys and on the meninges, and a few small tuberculous ulcers in the intestines; the cervical and one bronchial gland were caseous and the mesenteric glands contained tubercles. The child was admitted to hospital for acne, and in an emulsion of pustules from the skin tubercle bacilli were found.

Cultures were raised from the lung and from the acne spots, in each case through the guinea-pig; they grew luxuriantly on artificial media and had low virulence for the rabbit.

TUBERCULOSIS OF THE SUPRARENAL BODIES.

One case of Addison's disease in a man aged 21 has been investigated (Virus H. 87. "W.D."). Post-mortem examination showed typical fibro-caseous change in both suprarenal bodies and a few fibro-caseous nodules in the left lung.

A culture obtained from a suprarenal body through the guinea-pig grew luxuriantly on artificial media and was only slightly virulent for the calf and rabbit.

HUMAN MILK.

The milk from four nursing women regarded as suffering from pulmonary disease has been tested for the presence of tubercle bacilli.

The experiments were made with a view to ascertaining whether tubercle bacilli are excreted in the milk of the tuberculous human female.

The diagnosis of pulmonary tuberculosis, based solely upon clinical signs (cough, expectoration, etc.) was confirmed in one only of the four cases by the results of the inoculation of the sputum into guinea-pigs.

In the sputum of this case (H. 147. "P.C.") no tubercle bacilli were demonstrated microscopically and only slight tuberculosis was produced in the guinea-pigs.

The milk of this tuberculous patient, investigated on four separate occasions, as well as that from the other three patients who were not apparently tuberculous, did not produce tuberculosis in guinea-pigs.

CASES WHICH DID NOT PRODUCE TUBERCULOSIS IN GUINEA-PIGS.

In seven cases the material submitted, though containing lesions apparently of a tuberculous nature, did not produce tuberculosis in guinea-pigs. These cases fall into two groups, one group containing those in which bacilli indistinguishable from tubercle bacilli were demonstrated in smear preparations from the original material, the other those in which no bacilli were found in the smear preparations.

In the first group there are two cases. In one of these (H. 73. "M.E.") the material was caseo-calcareous mesenteric glands from a girl aged 10½ years who died of heart disease; there was no sign of tuberculosis elsewhere in the body. Tubercle bacilli were numerous in emulsions made from the glands, but two rabbits and one guinea-pig inoculated with them remained healthy and no colonies were obtained on the culture tubes sown.

In the other case (Virus H 28. "C.L." (*c*)) the original material was caseo-calcareous inguinal glands removed by operation from a boy aged 5 years. A few tubercle bacilli were demonstrated microscopically in an emulsion made from the glands but guinea-pigs and rabbits inoculated with it remained healthy and culture tubes sterile. Tuberculous glands from this child had been used for investigation on two previous occasions*; when the boy was 14 months old enlarged caseous glands were removed from the right side of the neck and from these a culture was obtained which was identical in every respect with a bovine tubercle bacillus; fifteen months later caseous glands from the opposite side of the neck were excised; emulsions from these glands did not produce tuberculosis in guinea-pigs and all the culture tubes sown remained sterile. [H. 86. "C.P." furnishes an additional example of the apparent death of tubercle bacilli in human tuberculous tissues. Emulsions of lung and a bronchial gland of the child though demonstrated to contain tubercle bacilli did not produce tuberculosis in guinea-pigs, and culture tubes sown with the emulsions remained sterile. The child died of tuberculous meningitis and cultures were obtained from the meninges. *See* page 11.]

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* The investigation of this virus on these two occasions was made by Dr. Cobbett. Among the cases of human tuberculosis investigated by him were two others the lesions from which though containing tubercle bacilli did not produce tuberculosis in guinea-pigs. The lesions in one of the cases were the caseous mesenteric glands of a child aged 7 who died of diphtheria; the lesion in the other was a tuberculous axillary gland removed by operation from a boy aged 14 years. *See* Appendix to the 2nd Interim Report, Vol. II, page 17.

In the second group there are five cases. The original material in these cases was calcareous mesenteric glands from adults who died from diseases unrelated to tuberculosis (the ages of the patients varied from 21 to 90 years) and showed at the post-mortem examination, with the exception of the mesenteric glands, nothing suggestive of tuberculosis. Emulsions were made from the glands in each case and inoculated into guinea-pigs; none developed tuberculosis.

SUMMARY.

Cultures from 54 cases of tuberculosis in human beings have been investigated.

The material furnishing the cultures was obtained from cases of alimentary tuberculosis (eleven), tuberculous meningitis (three), general miliary tuberculosis (two), tuberculosis of the suprarenal bodies (one), tuberculosis of bones and joints (four) and pulmonary tuberculosis (thirty-three); in twenty-nine of the cases of pulmonary tuberculosis the cultures investigated were obtained from the sputum.

In those cases of generalised tuberculosis caused by bacilli which had entered the body by way of the alimentary tract cultures were isolated not only from the glands nearest the points of entry of the bacilli but also from the disseminated lesions, and in several of the other cases in which there were lesions in different parts of the body more than one strain has been isolated and separately investigated.

In two instances human and bovine tubercle bacilli were isolated from the same patient and these were in each instance associated together in the same lesion, in one case a caseous retro-peritoneal gland in an old man aged 70 years who died of pneumonia and showed tuberculosis limited to the glands draining the small intestine, in the other a caseous bronchial gland in a child aged 4½ years who died of general tuberculosis. From other lesions in these two patients human tubercle bacilli only were isolated.

The cultures isolated from the other cases fall readily into one or other of two groups, one containing bacilli indistinguishable from bovine tubercle bacilli, the other bacilli (human tubercle bacilli) which grow more luxuriantly and have lower virulence for the rabbit and much lower virulence for the calf than the bovine tubercle bacillus.

Bovine tubercle bacilli were isolated from four of the ten cases of alimentary tuberculosis in children and from two of the cases of pulmonary tuberculosis (sputum).

The four children in question died as a result of infection with bovine tubercle bacilli, the cause of death in one case being general tuberculosis, in another tuberculous meningitis, in another tuberculous peritonitis and in the fourth stricture of the intestines following tuberculous ulceration; the ages of the children were 1, 2, 4, and 8½ years.

The two patients from whose sputum bovine tubercle bacilli were obtained were adults aged 21 and 31 years. Pure cultures of bovine tubercle bacilli were isolated from one of these patients on four different occasions (twice direct) and from the other on two (once direct).

Human tubercle bacilli were isolated from the remaining 46 cases, *i.e.*, six cases of alimentary tuberculosis, thirty-one of pulmonary tuberculosis and nine of various other forms of tuberculosis.

Of the six children with alimentary tuberculosis three were under twelve months old, the other three were aged 1¾, 4, and 7 years. Two died of general tuberculosis, two of tuberculous meningitis, one of tuberculous peritonitis, and one of pleurisy and pericarditis. The patients with pulmonary tuberculosis were aged 16 to 33 years with the exception of one who was 50 years old.

In seven instances the material submitted though apparently tuberculous did not produce tuberculosis in guinea-pigs. In two of these cases emulsions of the material showed microscopically numerous bacilli indistinguishable from tubercle bacilli ; in the others no tubercle bacilli were demonstrated.

The material from one of the first two cases was the caseo-calcareous mesenteric glands of a girl aged 10½ years who died of heart disease ; the tuberculosis was limited to the mesenteric glands.

In the other case the material was caseous inguinal glands from a boy aged five years ; tuberculous material from this boy had been investigated on two previous occasions, once when he was fourteen months old and again when he was 2½ years old. The earliest obtained material, caseous cervical glands, produced tuberculosis in guinea-pigs and a bacillus was isolated direct which was identical with a bovine tubercle bacillus. The second material, caseous cervical glands from the opposite side of the neck, and the third, the latest material, caseous inguinal glands, did not produce tuberculosis in guinea-pigs and culture tubes sown remained sterile.

In the five cases in which no tubercle bacilli were demonstrated the material was calcareous mesenteric glands (or calcareous nodules from mesenteric glands) from adults (ages 20 to 90 years) who had died from various diseases ; there were no lesions suggestive of tuberculosis anywhere else in the bodies of these patients.

The milk from four nursing women regarded as suffering from pulmonary tuberculosis did not produce tuberculosis in guinea-pigs ; the diagnosis of pulmonary tuberculosis was confirmed in one case only by the demonstration of tubercle bacilli in the sputum by guinea-pig inoculation.

TABULAR SUMMARY OF THE RESULTS OF THE INVESTIGATION OF CULTURES OBTAINED FROM FIFTY-FOUR CASES OF HUMAN TUBERCULOSIS.

Designation of Virus.	Nature of Tuberculosis.	Age of Patient.	Cause of Death.	Source of Culture.	Cultural Characters.	Pathogenicity		Classification of Culture.
						For Calf.	For Rabbit.	
H. 70. "N.W."	Alimentary tuberculosis (in children), including two cases of tuberculosis considered primary in the cervical glands.	10 months.	Tuberculous meningitis and general tuberculosis.	1. Cervical gland.	Grow luxuriantly.		—	Group II.
				2. Mesenteric gland.			—	
				3. Lung ...			—	
				4. Bronchial gland.			—	
H. 74. "D.S."		7 months.	Tuberculous meningitis.	1. Mesenteric gland.	Grow luxuriantly.	—	—	Group II.
				2. Lung ...		—	—	
				3. Spleen			—	
				4. Bronchial gland.			—	
H. 75. "A.H."		7 years	Tuberculous peritonitis.	1. Peritoneal fluid.	Grow luxuriantly.	—	—	Group II.
				2. Lung ...			—	
H. 78. "O.D."		9 months.	General tuberculosis and broncho-pneumonia.	1. Lung ...	Grow luxuriantly.		—	Group II.
				2. Meninges		—	—	
				3. Bronchial gland.		—	—	
H. 82. "G.F."		4 years	Pleurisy and pericarditis.	1. Mesenteric gland.	Grow luxuriantly.		—	Group II.
				2. Lung ...			—	
H. 83. "G.C."		1¾ years	Tuberculous meningitis.	1. Mesenteric gland.	Grow luxuriantly.		—	Group II.
				2. Bronchial gland.			—	
H. 69. "F.K."		2 years	Tuberculous meningitis.	1. Mesenteric gland.	Grow like a bovine tubercle bacillus.	✠	✠	Group I.
				2. Meninges		✠	✠	
H. 77. "R.L."		13 months.	Tuberculous peritonitis.	1. Mesenteric gland.	Grow like a bovine tubercle bacillus.	✠	✠	Group I.
				2. Liver ...			✠	
H. 88. "E.L."		8½ years	Stricture of intestine (tuberculous).	Mesenteric gland.	Grows like a bovine tubercle bacillus.	✠	✠	Group I.
H. 89. "W.I."		4 years	General tuberculosis.	1. Mesenteric gland.	Grow like a bovine tubercle bacillus.		✠	Group I.
				2. Lung ...		✠	✠	
H. 90. "I.P."	Alimentary tuberculosis (in an adult).	70 years	Pneumonia	1. Mesenteric gland.	Grow luxuriantly.		—	Group II.
				2. Retro-peritoneal gland.		+	+	Mixture of Group I. and Group II.

✠ *Denotes that the cultures are highly virulent.*
+ *Denotes that the cultures are of intermediate virulence.*
— *Denotes that the cultures are of low virulence.*

TABULAR SUMMARY OF THE RESULTS OF THE INVESTIGATION OF CULTURES OBTAINED FROM FIFTY-FOUR CASES OF HUMAN TUBERCULOSIS—*continued.*

Designation of Virus.	Nature of Tuberculosis.	Age of Patient.	Cause of Death.	Source of Culture.	Cultural Characters.	Pathogenicity		Classification of Culture.
						For Calf.	For Rabbit.	
H. 86. "C.P."	Tuberculous meningitis, and slight tuberculosis of lung (primary lesion) and bronchial glands.	3½ years	Tuberculous meningitis.	Meninges	Grows luxuriantly.		—	Group II.
H. 98. "B.R."	Tuberculous meningitis Origin uncertain.	7 years	Tuberculous meningitis.	Cerebro-spinal fluid.	Grows luxuriantly.		—	Group II.
H. 115. "N.G."	Tuberculous meningitis	3 years	Tuberculous meningitis.	Cerebro-spinal fluid.	Grows luxuriantly.		—	Group II.
H. 93. "C.D."	General miliary tuberculosis (origin uncertain).	2¼ years	Tuberculous meningitis and general tuberculosis.	1. Lung ...	Grow luxuriantly.		—	Group II.
				2. Acne spots			—	
H. 60. "W.B."	General miliary tuberculosis (origin uncertain.)	4½ years	Tuberculous meningitis and general tuberculosis.	1. Meninges	Grow luxuriantly.	—	—	Group II.
				2. Lung ...		—	—	
				3. Mesenteric gland.		—	—	
				4. Bronchial gland.		✠	✠	Mixture of Group I. and Group II.
H. 87. "W.D."	Tuberculosis of the suprarenal bodies.	21 years	Addison's disease.	Suprarenal body.	Grows luxuriantly.	—	—	Group II.
H. 67. "E.P."	Tuberculosis of bone.	14 years	(operation)	Pus from scapular abscess.	Grows luxuriantly.	—	—	Group II.
H. 68. "R.B."		69 years	(operation)	Pus from sacral abscess.	Grows luxuriantly.	—	—	Group II.
H. 72. "H.C."		49 years	(operation)	Pus from rib abscess.	Grows luxuriantly.	—	—	Group II.
H. 76. "G.M."	Tuberculosis of joint.	30 years	(operation)	Synovial membrane of kneejoint.	Grows luxuriantly.		—	Group II.
H. 79. "J.N."	Pulmonary tuberculosis.	24 years	Strictures of intestine.	Lung	Grows luxuriantly.	—	—	Group II.
H. 80. "D.M."		33 years	Tuberculous pleurisy.	Lung	Grows luxuriantly.	—	—	Group II.
H. 81. "P.W."		33 years	Phthisis	Lung	Grows luxuriantly.	—	—	Group II.
H. 104. "E.R."		31 years	Phthisis	1. Lung ...	Grow luxuriantly.	—	—	Group II.
				2. Mesenteric gland.			—	

✠ *Denotes that the cultures are highly virulent.*
— *Denotes that the cultures are of low virulence.*

TABULAR SUMMARY OF THE RESULTS OF THE INVESTIGATION OF CULTURES OBTAINED FROM FIFTY-FOUR CASES OF HUMAN TUBERCULOSIS—*continued.*

Designation of Virus.	Nature of Tuberculosis.	Age of Patient.	Source of Culture.	Cultural Characters.	Pathogenicity		Classification of Culture.
					For Calf.	For Rabbit.	
H. 118. "F.C." ...	Pulmonary Tuberculosis.†	50 years	Sputum	Grows luxuriantly		—	Group II.
H. 119. "E.S." ...		22 years	Sputum	Grows luxuriantly		—	Group II.
H. 120. "B.W."...		21 years	Sputum	Grows luxuriantly		—	Group II.
H. 121. "E A." ...		23 years	Sputum	Grows luxuriantly		—	Group II.
H. 122. "F.P." ...		28 years	Sputum	Grows luxuriantly		—	Group II.
H. 123. "W.W."		17 years	Sputum	Grows luxuriantly		—	Group II.
H. 124. "M.M."		17 years	Sputum	Grows luxuriantly	—	—	Group II.
H. 125. "A.P."		25 years	Sputum	Grows luxuriantly		—	Group II.
H. 126. "A.W."		16 years	Sputum	Grows luxuriantly		—	Group II.
H. 127. "R.R." (*a*)		21 years	Sputum	Grow like a bovine tubercle bacillus.	✠	✠	Group I.
" " (*b*)		(76 days older)	Sputum			✠	
" " (*c*)		(117 days older)	Sputum		✠	✠	
" " (*d*)		(118 days older)	Sputum			✠	
H. 128. "D.D." (*a*)		31 years	Sputum	Grow like a bovine tubercle bacillus.	✠	✠	Group I.
" " (*b*)		(118 days older)	Sputum		✠	✠	
H. 129. "T.M." ...		33 years	Sputum	Grows luxuriantly	—	—	Group II.
H. 130. "N.B." ...		26 years	Sputum	Grows luxuriantly		—	Group II.
H. 131. "M.H."...		29 years	Sputum	Grows luxuriantly		—	Group II.
H. 132. "O.O." ...		18 years	Sputum	Grows luxuriantly		—	Group II.
H. 133. "P.K." ...		24 years	Sputum	Grows luxuriantly		—	Group II.
H. 134. "K.K." ...		20 years	Sputum	Grows luxuriantly		—	Group II.
H. 135. "E.E." ...		21 years	Sputum	Grows luxuriantly		—	Group II.
H. 136. "X.B." ...		28 years	Sputum	Grows luxuriantly		—	Group II.
H. 137. "O B." ...		20 years	Sputum	Grows luxuriantly		—	Group II.
H. 138. "C.C." ...		29 years	Sputum	Grows luxuriantly		—	Group II.
H. 139. "K.H." ...		23 years	Sputum	Grows luxuriantly		—	Group II.
H. 140. "J.J." ...		22 years	Sputum	Grows luxuriantly		—	Group II.
H. 141. "C.H." ...		25 years	Sputum	Grows luxuriantly		—	Group II.
H. 142. "Q.H." ...		22 years	Sputum	Grows luxuriantly		—	Group II.
H. 143. "L.L." ...		22 years	Sputum	Grows luxuriantly	—	—	Group II
H. 144. "D.B." ...		29 years	Sputum	Grows luxuriantly		—	Group II.
H. 145. "G.W." ...		21 years	Sputum	Grows luxuriantly		—	Group II.
H. 147. "P.C." ...		39 years	Sputum	Grows luxuriantly		—	Group II.
H. 150. "C.K."		*22 years*	*Sputum*	*No culture was obtained because the G.P.'s died of peritonitis.*		— (*Sputum*)	*The sputum had the virulence of a Group II. organism.*

† Sputum from nine other persons thought to be suffering from pulmonary tuberculosis was sent for investigation. Seven were children (age 9 to 13 years) and their sputum, in which no tubercle bacilli were demonstrated, caused in two cases acute infection and in the others no tuberculosis in the guinea-pigs inoculated. The sputum from the other two (both adults) caused septic peritonitis in the guinea-pigs inoculated; in one case no tubercle bacilli, in the other numerous tubercle bacilli, were found microscopically in the sputum.

✠ *Denotes that the cultures are highly virulent.*
— *Denotes that the cultures are of low virulence.*

TABULAR SUMMARY OF THE RESULTS OF THE INVESTIGATION OF SEVEN CASES WHICH DID NOT PRODUCE TUBERCULOSIS IN GUINEA-PIGS.

Designation of Virus.	Nature of Case.	Age of Patient.	Cause of Death.	Material Used for Investigation.	Result of Investigation.
H. 73. "M.E." ...	**Caseo-calcareous mesenteric glands.**	10½ years	Heart disease	Mesenteric glands.	Two rabbits and one guinea-pig were inoculated with emulsions of the glands; they remained healthy. Culture tubes sown from the glands remained sterile. Tubercle bacilli were numerous in the emulsions.
H 94. "R.M." ...	**Calcareous mesenteric glands.**	21 years	Gastric ulcer	Mesenteric gland.	Two or three guinea-pigs were inoculated with emulsions of the glands in each case; they did not develop tuberculosis. In the case of H 94 culture tubes were sown with the emulsion made from the gland; no growth resulted. All the emulsions were examined microscopically; no tubercle bacilli were seen in any of them.
H. 95. "B.C." ...		49 years	Carcinoma	Mesenteric glands.	
H. 96. "E.H." ...		42 years	Aneurism	Mesenteric glands.	
H. 97. "E.B." ...		90 years	Syncope	Mesenteric glands.	
H. 116. "B.F." ...		20 years	Endocarditis	Mesenteric glands.	
H. 28. "C.L." (*c*)†	**Caseo-calcareous inguinal glands.**	5 years	(operation)	Inguinal glands.	An emulsion made from the glands showed tubercle bacilli; guinea-pigs and rabbits inoculated with it did not develop tuberculosis, and culture tubes sown with it remained sterile.

† Tubercle bacilli with the properties of the bovine tubercle bacillus were isolated from the caseous right cervical glands nearly four years previously when the child was 14 months old (H. 28. C.L. (*a*)). An emulsion of caseous cervical glands removed from the opposite side of the neck 15 months later did not produce tuberculosis in guinea-pigs, and culture tubes sown from the glands remained sterile (H. 28. C.L. (*b*)). (*See* 2nd Interim Report, Appendix, Vol. II, page 621.)

TABULAR SUMMARY OF THE RESULTS OF THE INVESTIGATION OF MILK AND SPUTUM FROM NURSING WOMEN WITH CLINICAL SIGNS OF PULMONARY TUBERCULOSIS.

Designation of Virus.	Age of Patient.	Result of Investigation.	
		Of Milk.	Of Sputum.
H. 146. "N.F." ...	33 years (multipara).	Two samples of milk, one obtained 19 days later than the other, were tested on guinea-pigs with negative results; microscopical examinations of the milk were also negative.	Two samples of sputum obtained at the same time as the milks did not produce tuberculosis in guinea-pigs, and microscopical examinations showed no tubercle bacilli.
H. 147. "P.C." ...	39 years (multipara).	Four samples of milk were obtained, three on successive days, the other six weeks earlier. They were tested on guinea-pigs with negative results; microscopical examinations of the milks were also negative.	Sputum was received on one occasion only (on the day the milk was first obtained). No tubercle bacilli were seen in it on microscopical examination, but guinea-pigs inoculated with it became tuberculous, and from one of these a culture of human tubercle bacilli was isolated. (*See* page 17.)
H. 148. "P.B." ...	26 years (multipara).	One sample of milk was obtained; the guinea-pigs inoculated with it remained healthy, and microscopical examination was negative.	One sample of sputum was obtained; no tubercle bacilli were seen in it on microscopical examination, and guinea-pigs inoculated with it remained healthy.
H. 149. "N.C." ...	36 years (multipara).	Milk was received on one occasion only. Microscopical examination and guinea-pig inoculations were negative.	Sputum was received on one occasion only. No tubercle bacilli were seen in it on microscopical examination, and a guinea-pig inoculated with it remained healthy.

CHARTS SHOWING EXTENT AND DISTRIBUTION OF DISEASE IN CASES OF TUBERCULOSIS IN CHILDREN PRIMARY IN THE ALIMENTARY TRACT, DUE (*a*) TO BOVINE TUBERCLE BACILLI, (*b*) TO HUMAN TUBERCLE BACILLI.

(*a*) Viruses virulent for bovines and rabbits (Group I).

No. of Virus.	Age of Child.	Cause of Death.	Intestines.	Cervical Glands.	Mesenteric Glands.	Lungs.	Bronchial Glands.	Spleen.	Liver.	Kidneys.	Meninges.	Serous Surfaces.	
												Peritoneum.	Pleura.
H. 7. "C.M."	3 yrs.	Tuberculosis	+ (one ulcer.)		✠	✠	○	✠	+	+	✠	+	
H. 10. "B.S."	$1\frac{9}{12}$ yrs.	Peritonitis (?) tuberculous	○	○	✠	○	+	○	○	○	○	+	○
H. 14. "F.S."	$4\frac{1}{2}$ yrs.	Tuberculosis	✠		✠	✠	enlarged.	✠	+	+		✠	
H. 19. "S.W."	$2\frac{9}{12}$ yrs.	Tuberculosis	○		✠	+	○	✠	+	+	✠	○	slight adhesions.
H. 20. "F.L."	$2\frac{10}{12}$ yrs.	Tuberculosis	✠		✠	○	○	+	○	○		✠	
H. 32. "Y.W."	$2\frac{9}{12}$ yrs.	Tuberculosis	✠		✠	✠	+	✠	+	○	○	+	
H. 38. "J.M."	$1\frac{3}{12}$ yrs.	Broncho-pneumonia.	✠	✠	✠	○	○					✠.	
H. 59. "L.B."	$2\frac{3}{4}$ yrs.	Tuberculosis	✠	+	✠	✠	slightly enlarged.	○	○	+	+	○	
H. 64. "M.G."	$4\frac{9}{12}$ yrs.	Tuberculosis	○		+	✠	○	○	+	✠	✠	○	
H. 65. "K.B."	$1\frac{1}{2}$ yrs.	Whooping cough (?)	✠		✠	○	○	(?)	○	○	○	○	
H. 69. "F.K."	2 yrs.	Tuberculosis	+	○	+	○	○	○	○	○	✠	+	○
H. 77. "R.L."	$1\frac{1}{12}$ yrs.	Tuberculosis	✠		✠	○	○	○	○	○	○	✠	
H. 88. "E.L."	$8\frac{7}{12}$ yrs.	Tuberculosis	✠		✠	○	+	○	(?)	○	○	○	
H. 89. "W.I."	4 yrs.	Tuberculosis	✠		✠	✠	slightly enlarged.	○	○	+	○	+	

(*b*) Viruses slightly virulent for bovines and rabbits (Group II).

No. of Virus.	Age of Child.	Cause of Death.	Intestines.	Cervical Glands.	Mesenteric Glands.	Lungs.	Bronchial Glands.	Spleen.	Liver.	Kidneys.	Meninges.	Serous Surfaces.	
												Peritoneum.	Pleura.
H 6. "U.H."	3 yrs.	Tuberculosis	✠		✠	+	✠		✠	+		✠	
H. 8. "S.C."	11 mths.	Tuberculosis	+ (one ulcer.)	enlarged.	✠	✠		✠	✠	✠			✠ (Pericardium).
H. 18. "T.T."	$2\frac{5}{12}$ yrs.	Tuberculosis	✠		✠	✠	✠	+	+	+		✠	
H. 30. "E M."	$3\frac{10}{12}$ yrs.	Tuberculosis	✠	enlarged.	✠	(?)	✠	○	○	○	○	(?)	
H. 36. "M.D."	$4\frac{1}{2}$ yrs.	Tuberculosis	✠		✠	+	✠	+	○	○	✠	○	✠
H. 55. "R.D."	$2\frac{9}{12}$ yrs.	Broncho-pneumonia.	+	+	+	○	+	+	○	○			
H. 57. "B.J."	1 year	Tuberculosis	✠	✠	✠	✠	+	○	+	+	(?)	○	
H. 63. "G.R."	7 mths.	Tuberculosis and mitral stenosis.	✠	✠	✠	✠	✠	+	+	+	✠	○	adherent.
H.0.7 "N.W."	10 mths.	Tuberculosis	✠	+	✠	✠	✠	✠	✠	+	✠	+	
H. 74. "D.S."	7 mths.	Tuberculosis	one doubtful ulcer.		✠	+	✠	✠	✠	+	✠	○	
H. 75. "A.H."	7 yrs.	Tuberculosis	+		+	+	✠	○	○	○	○	✠	
H. 78. "O.D."	9 mths.	Tuberculosis and broncho-pneumonia.	○	✠	○	✠	✠	✠	+	+	✠	○	
H 82. "G.F."	4 yrs.	Pleurisy and pericarditis.	○	+	+	+	✠	+	○	○		○	
H. 83. "G.C."	$1\frac{9}{12}$ yrs.	Tuberculosis	○	+	+	✠	✠	✠	+	+	✠	○	

✠ *Denotes severe disease.* + *Denotes slight disease.* ○ *Denotes "no tuberculosis."*

THE CULTURAL CHARACTERS AND PATHOGENICITY OF THE CULTURES ISOLATED.

GENERAL SUMMARY.

The cases of human tuberculosis dealt with in this report have been ascribed to one or other of two kinds of bacilli, one of which is referred to as the human tubercle bacillus the other as the bovine tubercle bacillus.

This division into two types is based upon differences in cultural characters and in virulence for certain animals.

Cultural characters.—The investigation of the cultural characters has shown that the bacilli vary greatly in the way they grow upon artificial media and according to these characters are arranged in two groups. The media used for differentiating were serum and various substances containing glycerin.

The bacilli in one group, the smaller of the two, containing only six out of the fifty-four viruses investigated, grow like bovine tubercle bacilli and exhibit the same range of variation in their cultural characters, being divisible into three classes.

The cultures in the other group grow more luxuriantly than the most easy growing of the cultures in the first group and have shown so little variation in their cultural characters that a division into classes has not been attempted.

Differences are also demonstrated as a rule in the reaction of glycerin broths on which bovine and human tubercle bacilli have grown. The acidity of glycerin broth on which the bovine tubercle bacillus has grown is generally less than it was originally, while that of a broth on which the human tubercle bacillus has grown is generally greater. The extent however to which the acidity is lowered by the one type of bacillus or raised by the other has shown such variation that no clear distinction in bio-chemical properties appears between the two groups of bacilli; moreover in many instances the reactions of strains of the two types of bacilli have been identical. The variations in reaction of either type are attributable more to variations in amount of growth than to specific differences in power of acting upon any particular substance in the broth.

In broth without glycerin, or in glucose broth, bovine and human tubercle bacilli react in the same way, the acidity is gradually reduced, the extent of reduction depending directly on the amount of growth.

Changes in reaction corresponding to those which take place in glycerin broth are observed in glycerin litmus milk when tubercle bacilli are grown upon its surface. During the early stages of growth the milk becomes more blue, then as the pellicle expands and thickens the change in the alkaline direction is arrested and one in the opposite direction begins, the original colour is regained, and with further increase in the thickness of the pellicle the milk becomes pink. When the surface growth is very luxuriant the milk clots. (For detailed account *see* pages 24–28.)

Virulence.—For testing the virulence of the cultures the method mainly relied upon has been subcutaneous inoculation. Other methods, the intravenous and the intraperitoneal, have been employed for certain species. A few feeding experiments, which are considered later, have also been performed. For the determination of the virulence of a culture the rabbit has been systematically employed as the standard test animal. Experience has shown that this animal can be relied upon to differentiate between bacilli of high and low bovine virulence.

All the cultures which exhibited the cultural characters of bovine tubercle bacilli were tested on calves.

It was considered unnecessary to test in every instance on calves cultures which grew luxuriantly and produced in rabbits local or slight disseminated tuberculosis after subcutaneous inoculation; experiments published in the 2nd Interim Report have proved quite conclusively that cultures with these properties are when subcutaneously inoculated incapable of setting up in calves more than a limited retrogressive tuberculosis; in several instances however such cultures have been inoculated into calves, either to control the results obtained in rabbits or to establish the virulence of cultures from viruses which were used for passage experiments.

The cultures in the first group were highly virulent for the rabbit and the calf and produced in them progressive tuberculosis identical with that set up by bovine tubercle bacilli.

All the cultures in the second group exhibited lower virulence for the rabbit than those in the first group and seventeen, representing fifteen viruses, were also shown to be slightly virulent for the calf.

A number of other species of animals has also been inoculated, not to differentiate the various viruses, but to compare the effects produced in a given species by the two types of culture ; in the case of the guinea-pig all the viruses have been tested but as regards other species of animals representatives only of the two groups have been inoculated into them.

The inoculation experiments have shown that different species of animals vary greatly in their susceptibility to a given type of bacillus, and that some species of animals react in the same manner, others in a different manner to both types of bacilli.

These resemblances and differences in susceptibility to the two types of bacilli permit a division of animals into three groups. In each of two of the groups the action of the two kinds of bacilli is practically identical, the first group containing the animals which are very susceptible, the second group the animals which are very resistant ; in the third group the animals are susceptible to one type of bacillus but resistant to the other.

The Susceptible Group.

The first group contains the susceptible animals the monkey (*macacus rhesus*), the chimpanzee and the guinea-pig. Either kind of bacillus has invariably produced in these three species fatal general progressive tuberculosis howsoever inoculated and in whatsoever dose.

The rhesus monkey is more susceptible than the guinea-pig and the disease produced runs a more rapid course. The disease set up in the monkey by one type of bacillus is identical with that set up by the other both in the rapidity of its development and in the character and distribution of its lesions.

The chimpanzee, like the rhesus monkey, is very susceptible to the action of the two types of bacilli.

In the guinea-pig differences have been noted in the effects produced by the two types of bacilli which indicate that the bovine tubercle bacillus is slightly more virulent for this animal than the human tubercle bacillus.

The bovine tubercle bacillus, as a general rule, gives rise in this animal to a more acute tuberculous process and causes death sooner than the human tubercle bacillus. In guinea-pigs infected with human tubercle bacilli the lymphatic glands do not generally become so large or so caseous as the glands of guinea-pigs infected with bovine tubercle bacilli, and there is often less necrosis of the spleen and sometimes of the liver and less rapid and complete caseation of the tubercles in the lungs in the former than in the latter animals. Corresponding to the differences in severity of infection are differences in duration of life ; the average duration of life of guinea-pigs inoculated with bovine tubercle bacilli is shorter than that of guinea-pigs inoculated with human tubercle bacilli as is shown in the Table on page 42. These differences are not however constant or definite enough to serve as a means of distinguishing the bovine from the human tubercle bacillus.

The Resistant Group.

The second group contains the resistant animals, the dog, the rat, and the mouse.

The dog and the rat are highly resistant to the subcutaneous inoculation of large doses and to the intraperitoneal inoculation of small doses of culture. When large doses are inoculated intraperitoneally both types of bacilli multiply freely in the tissues of these animals and cause their death, but without producing lesions which are typical of tuberculosis.

In the dog after intraperitoneal inoculation tissue changes are more marked than in the rat. There is generally very severe reaction of the peritoneal tissues, the omentum being thickened and necrotic, the peritoneum inflamed and covered with tubercles, and the peritoneal cavity filled with turbid serous fluid ; the pleural cavities also may contain fluid ; the spleen and liver may be enlarged and show numerous grey foci throughout their substance, the lungs show indefinite grey foci and patches of consolidation, the sternal and some of the abdominal lymph glands are enlarged and caseo-necrotic. The lesions are swarming with tubercle bacilli and tubercle bacilli are found in tissues which do not show lesions.

In the rat the changes visible to the naked eye after an intraperitoneal inoculation are generally limited to enlargement of the spleen and congestion and diffuse consolidation of the lungs ; these organs may, however, be normal to the naked eye. Smear preparations made from the spleen, liver, or lungs show numerous tubercle bacilli ; when the lungs are consolidated tubercle bacilli are always very numerous in them and occur mainly within cells ; in the very acute cases tubercle bacilli are numerous all over the body and have even been found in the blood.

The mouse closely resembles the rat in its reactions to the tubercle bacillus but offers less resistance to the growth of the bacillus in its tissues.

The Differential Group.

The third group is the differential group ; it contains the animals which are susceptible to the bovine tubercle bacillus and resistant to the human tubercle bacillus ; these animals are the calf, rabbit, pig, goat, and cat.

Rabbit.—Of these species the rabbit is the most susceptible, the bovine tubercle bacillus, no matter how small the dose, almost invariably causing generalised progressive tuberculosis, and the human tubercle bacillus disseminated tuberculosis which is usually not severe but is often of a slowly progressive character.

In order to bring out most clearly the differences in virulence for the rabbit of the two types of bacilli certain doses are necessary for the different methods of inoculation.

Rabbits inoculated intravenously with large doses of the slightly virulent bacillus do occasionally die of tuberculosis which it is difficult to distinguish from that produced by bovine tubercle bacilli, and rabbits inoculated subcutaneously with small doses of bovine tubercle bacilli occasionally develop a chronic form of tuberculosis which is not fatal within the period of observation and might easily be confused with the occasional severer forms of tuberculosis set up by human tubercle bacilli.

The doses which I have found to be the most suitable for differentiation are 10 milligrammes or more for subcutaneous injection and 0·01 milligramme or less for intravenous.

0·01 milligramme of bovine tubercle bacilli intravenously or 10 milligrammes subcutaneously inoculated has invariably produced in rabbits progressive tuberculosis fatal within 12 weeks. There has been no death of a rabbit from tuberculosis after the intravenous inoculation of 0·01 milligramme or the subcutaneous inoculation of 10 milligrammes of human tubercle bacilli, the period of observation being up to four months for the intravenous inoculations and up to longer periods for the subcutaneous.

Calf.—The calf is more resistant to both types of bacilli than the rabbit.

50 milligrammes of bovine tubercle bacilli inoculated subcutaneously invariably produces generalised tuberculosis which is usually progressive and ends fatally within the period of observation ; occasionally after a period of illness the calf recovers from the inoculation and when killed shows the lesions in a retrogressive condition ; this has occurred in two of the calves which have been recently inoculated with 50 milligrammes of culture. These exceptional results may be regarded as due to high resisting power of the individual calves, for other calves inoculated with the same culture developed rapidly fatal tuberculosis and rabbits died of tuberculosis in the usual time.

When doses smaller than 50 milligrammes are given individual susceptibility exercises a greater influence on the result as was shown in the series inoculated by Dr. Cobbett and myself. Out of 49 calves inoculated with 10 milligrammes of virulent cultures (human and bovine) 34 became fatally infected and 15 survived ; the latter were killed after 90 days ; 14 showed general tuberculosis varying in severity usually progressive, and one (No. 360) slight definitely retrogressive tuberculosis. (*See* Appendix to the 2nd Interim Report, Vols. I. & II.)

When using the calf to test the virulence of a culture of tubercle bacilli it is necessary therefore to inoculate subcutaneously a large dose, 50 milligrammes or more, and it is desirable if the calf is the only test animal to inoculate more than one animal.

The human tubercle bacillus is incapable when inoculated subcutaneously of setting up progressive tuberculosis in the calf, no matter how large the dose ; in about 40 per cent. of the cases, the tuberculosis was limited to the site of inoculation and the nearest glands ; in the remaining cases disseminated lesions were found, these were rarely numerous and were calcareous or caseous and retrogressive and were found generally in the lymphatic glands, the thoracic and mesenteric being the most frequently and extensively affected; the lungs usually contained sparsely scattered minute calcareous or grey tubercles discovered often only after careful search. The liver and spleen rarely and the kidneys never showed lesions; tubercles were occasionally found in the suprarenal bodies.

Goat.—The goat closely resembles the calf in its reactions to the bovine and human tubercle bacilli. Comparative experiments have shown that to the bovine tubercle bacillus the goat is more susceptible than the calf, a smaller dose being sufficient to produce general progressive tuberculosis.

In no case has anything more than slight retrogressive tuberculosis resulted from the inoculation of the goat with human tubercle bacilli.

Pig.—General tuberculosis is readily produced in the young pig (6 to 8 weeks old) by the bovine tubercle bacillus (subcutaneous and feeding) and the disease is usually progressive; occasionally the disseminated lesions become retrogressive and the animal when killed is fat and in apparent good health. Older pigs (9 months or more) are much more resistant than the young pig of 6 to 8 weeks as was clearly shown by the feeding experiments with bovine tubercle bacilli. (*See* Appendix to the 2nd Interim Report, Vol. I, Feeding Experiments.)

Pigs are very resistant to the human tubercle bacillus and the disease produced is never progressive; they appear to be slightly more susceptible than the calf to this type of bacillus, since disseminated lesions are more numerous and more frequently present in the pig than in the calf.

Cat.—Generalised progressive tuberculosis is readily produced in cats by the bovine tubercle bacillus and lesions which are typical of tuberculosis are produced in these animals when they are able to offer some resistance to the multiplication of the bacilli, as after subcutaneous inoculation.

When inoculated intraperitoneally the bacilli are quickly disseminated over the cat's body and multiply so rapidly in the tissues that death sometimes ensues before definite tuberculous lesions have had time to develop in the internal organs; death in these cases is due probably to the toxins produced by the tubercle bacilli which are present in such very large numbers in the tissues.

Kittens are more susceptible than cats to the bovine tubercle bacillus; their duration of life after all forms of inoculation is shorter, and they sometimes die after subcutaneous inoculation of an acute tuberculous infection similar to that following intraperitoneal inoculation.

The cat, both the young and the adult, is highly resistant to the human tubercle bacillus; slight generalised tuberculosis, which however was not progressive, has been produced by human tubercle bacilli intraperitoneally inoculated, but local tuberculosis only has followed subcutaneous inoculation.

FEEDING EXPERIMENTS.

Two series of feeding experiments have been performed one for the purpose of observing the effects produced in different species of animals by the human tubercle bacillus when introduced into the alimentary tract, the other of obtaining information as to the dissemination of tubercle bacilli (human and bovine) within short periods of their introduction into the alimentary canal.

The first series showed that the animals—the pig, the goat, the horse, the dog, the cat, and the rabbit—which are resistant to the human tubercle bacillus inoculated subcutaneously, are just as resistant to this bacillus when absorbed from the alimentary tract. The monkey and the guinea-pig, which are highly susceptible to the human tubercle bacillus inoculated subcutaneously, were the only animals to develop generalised progressive tuberculosis, but the experiments with them are unsatisfactory as it is possible that tubercle bacilli were insufflated into the lungs at the time of feeding.

The second series, combined with the results of previous experiments on the same lines, the animals used being the monkey, pig, goat, dog, and cat, showed that tubercle bacilli are able to pass through the mucous membrane of the alimentary tract and to reach the adjacent lymphatic glands within a few hours of their ingestion. Only a small proportion of the bacilli ingested are absorbed, the rest passing out with the faeces. Of those that are absorbed the majority are arrested in the glands but some, after a period the duration of which appears to vary with the animal used, are carried onwards into the lungs or even beyond; the shortest period of time between their ingestion and their demonstration in the lungs was 4 days. (*See* pages 50–52.)

MODIFICATION EXPERIMENTS. (*See* pages 55–89.)

THE GENERAL RESULTS OF THE INVESTIGATION OF THE CULTURAL CHARACTERISTICS AND PATHOGENIC EFFECTS OF THE VIRUSES.

The following pages contain detailed accounts of the methods employed in isolating the cultures, in determining their properties and in estimating doses for inoculation, and general descriptions of the cultural characters of the cultures and of the effects produced by their inoculation into different species of animals.

Original Material of the Viruses.

The original material of the viruses dealt with in this report consisted of tuberculous tissues and fluids and sputum obtained from 54 tuberculous human beings.

The tuberculous fluids, (pus, cerebro-spinal and peritoneal fluid), and some of the tissues, were obtained by operation and under aseptic conditions. The other tuberculous tissues were removed from the body after death with sterile instruments and were sent to the laboratory in sterile vessels; the portions of these tissues used for investigation were cut out of the centre of the organ or gland after carefully searing the surface with a cautery.

The sputum was expectorated directly into sterile wide-mouthed bottles, the patient's teeth, gums, and mouth having been previously cleansed.

Before inoculation the tuberculous tissues were emulsified. Emulsions of tissues are made in the following way: the tissue is ground to pulp in a porcelain mortar and emulsified in salt solution, the emulsion is passed through muslin to strain off the coarse particles, and the filtrate usually without further treatment is injected into animals. When a finer emulsion is desired, *e.g.*, in cases when an estimate of the number of tubercle bacilli is to be made, the filtrate is put on one side to allow the heavier particles to settle; when sedimentation has taken place the supernatant fluid is decanted into a beaker, and before pipetting off the sample for estimation and the doses for animal inoculation, the fluid is thoroughly shaken to secure even distribution of the tubercle bacilli.

The emulsions of the original material were in every instance inoculated into guinea-pigs and sometimes rabbits, and occasionally calves were also inoculated.

The sputum was not diluted but was drawn into a syringe directly from the specimen bottle and small quantities were inoculated intraperitoneally into guinea-pigs. Rabbits were also inoculated at first but the mortality from acute infections was so high that it was decided to discontinue testing the virulence of the tubercle bacilli in this way.

Attempts were always made to obtain cultures directly from original material whenever the material was in sufficient amount or not obviously contaminated with other organisms.

THE INVESTIGATION OF CULTURAL CHARACTERISTICS.

Method of obtaining Cultures.

Cultures of the tubercle bacillus have been isolated from each of the 54 viruses.

From 15 of the viruses cultures were raised directly from the original material as well as from guinea-pigs which had been inoculated with the original material; from the remaining viruses the cultures were obtained through the guinea-pig.

Frequently two strains have been isolated from the same lesion, directly and through a guinea-pig, or from two different guinea-pigs, and in the cases in which the tuberculosis was generalised two to four strains have been raised from lesions in different parts of the human body.

As regards the sputum two strains from different guinea-pigs were isolated from the majority of the samples, but only one was investigated at first, the other being held in reserve for investigation if the first culture displayed unusual features. In the cases of two of the sputum viruses cultures were obtained with the aid of antiformin directly from the sputum.

Altogether 105 strains have been isolated from the 54 viruses and the cultural characters of each have been separately determined.

No difference in cultural characters has been detected between different strains of the same virus and in this Report only the viruses are mentioned.

Method of preparation of the cultures from tuberculous material.

A small piece of the tuberculous tissue is removed with sterile precautions, placed in a short test-tube with foot, and broken up with a glass rod ground at the end; a few drops of salt solution are added with a pipette and the tissue and fluid are mixed together. Most of the tissues that may be used, being cheesy caseous substance or guinea-pig liver or spleen, readily emulsify; others, as for example fibro-caseous lesions, are difficult to break up and the emulsion that is obtained is often merely the diluted juices of the tissue.

Each culture tube is sown with a loopful or two of the emulsion, as free from coarse particles of tissue as possible, which is spread over the surface of the medium.

By the use of antiformin cultures have in three instances been obtained direct from sputum, twice in the case of Virus H. 127. "R.R." and once in that of H. 128. "D.D." Antiformin is a mixture of sodium hydrate and eau de Javelle and has the power to dissolve albuminous substances and to kill and dissolve all bacteria except those which like tubercle bacilli possess a waxy envelope.

Tubercle bacilli are said to resist the action of antiformin in 20 per cent dilution for 24 hours and to be capable at the end of that time of producing tuberculosis in guinea-pigs. The method I employed is that recommended by Uhlenhuth*; diluted sputum and antiformin were mixed together to form a 15 per cent antiformin sputum mixture and allowed to stand for three hours; the solution was then centrifuged, the centrifuged deposit was washed and recentrifuged, the deposit was then sown on to culture media or inoculated into animals.

In several experiments the tubercle bacilli, after an exposure for three hours to 15 per cent antiformin, were found incapable of growing upon artificial media or of producing tuberculosis in rabbits and guinea-pigs; but as the sputum used was nearly a fortnight old, the death of the bacilli may not have been due to the action of the antiformin.

In a recent experiment, a pure culture of tubercle bacilli was obtained from sputum (not 24 hours old) which had been exposed to the action of 10 per cent antiformin for only ten minutes. This sputum-antiformin mixture was tested again after 24 hours, and living tubercle bacilli were demonstrated still to be present, though in much diminished numbers.

In another experiment, with 5 per cent. antiformin, the same sputum a day older was used, the exposure varying from 10 to 30 minutes; a few colonies grew on the tubes, but none were composed of tubercle bacilli; guinea-pigs inoculated with centrifuged deposits of this mixture did not develop tuberculosis.

It would appear, therefore, from these results that it is necessary for the successful application of the method to use fresh sputum.

The medium used for all the primary cultures has been a medium made with egg.

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* Centralbl. f. Bakt. etc. 1 Abt. Referate. Bd. XLII, page 62.

Method of preparation of the egg medium.

The yolk and the white of fresh eggs are thoroughly mixed by shaking in a flask; salt solution is added in the proportion of one to three of egg; the mixture is filtered through muslin, distributed into tubes, sloped and coagulated in a serum inspissator at 80° C.

This medium first employed by Dorset is invaluable for obtaining the tubercle bacillus in pure culture and can be relied upon to produce colonies if the material implanted contain living tubercle bacilli. The medium is of great value also for subcultures; on it the tubercle bacillus retains its vitality for a longer period than on any other medium and by its means cultures can often be obtained from serum cultures which have failed to grow when sown on to serum or other media.

CULTURAL CHARACTERS OF THE CULTURES ISOLATED.

Primary cultures.

Colonies when numerous first become visible to the unaided eye within the first fortnight, 6th to 10th day; when few in number they may not be observed until the third week. The colonies appear as transparent points. If the emulsion sown was rich in bacilli the surface of the medium shows at the end of three weeks a dull grey layer in which, on further incubation, raised white colonies may develop. When the colonies are sparsely distributed they grow sometimes to a large size, becoming heaped-up creamy and occasionally nodular.

Subcultures.

From the egg the bacillus is transferred to serum on which it is subcultivated until it is growing vigorously enough to be tested on the differential media; all the tests have been made with young serum subcultures, generally not more than a week old. Since bovine tubercle bacilli grow with increased luxuriance on glycerin media after subculture on a medium containing glycerin it is essential for the correct classification of tubercle bacilli to use for testing purposes cultures which have never been grown upon a glycerin medium.

The differential media are serum and various substances containing glycerin, namely, serum, agar, potato and broth; the serum, agar and broth contain 5 per cent glycerin and are prepared in the customary way. The potato is cut into slices put into water and soaked for 24 hours in a 5 per cent glycerin blue-litmus solution, which is poured off before the first sterilization; at the bottom of each tube is some absorbent cotton-wool on which the potato slice rests; the wool soaked with glycerin solution helps to keep the potato moist.

On the differential media the majority of the viruses have produced luxuriant growths while the remainder have grown much less luxuriantly.

According to the characters of their growth on these media the viruses have been divided into two main groups.

Group I.—The first group is a small one and contains only six out of the 54 viruses investigated; the original material of four of these viruses was obtained from children who had died of tuberculosis primary in the alimentary tract; the original material of the other two was sputum from adults with clinical signs of pulmonary tuberculosis.

The members of this group differ among themselves in their manner of growth on glycerin media and are arranged in three classes which correspond exactly to the three into which bovine viruses have been divided. (*See* Appendix to 2nd Interim Report, Vol. III, page 5.) The differentiation into classes is based upon differences brought out by the use of the glycerin media; on serum no important differences between the members of the group have been observed, each virus producing a uniform dull grey or greyish-white layer free from pigment.

Class 1 contains the three viruses H. 77 (3 strains), H. 89 (3 strains), and H. 128 (3 strains), which grow with most difficulty on glycerin media. On glycerin serum no growth was apparent until towards the end of the second week when discrete colonies became visible; at the end of a month the colonies had coalesced in places forming a patchy dry grey layer. On glycerin-agar no growth has been obtained with any of the strains. On potato a thin dull grey layer was produced in which subsequently raised colonies resembling little pearls developed. On broth growth was scanty and appeared as filmy islands or a thin grey almost transparent membrane.

In Class 2 there are two viruses H. 69 (2 strains) and H. 127 (8 strains). These viruses produced better growths on glycerin serum than on serum, but the growths were not so uniform and exhibited opaque whitish patches; on agar in one case a thin patchy grey layer showing a fine wrinkling was formed, and in another greyish-white patches in which raised colonies subsequently made their appearance. On potato the growths resembled those produced by the Class 1 viruses. On broth thin grey or greyish-white membranes were formed, several of which sank wholly or in part.

In Class 3 there is only one virus H. 88 (2 strains). On glycerin serum the strains produced more abundant growths than on serum; on glycerin-agar moist greyish-white wrinkled layers of moderate thickness were obtained, on potato the best growths were greyish-white moderately thick moist with raised wrinkled or warty patches; pellicles of moderate thickness were produced on broth but they soon became moist and sank.

The method of obtaining surface growths on broth was that devised by Dr. Eastwood: serum is coagulated in an ordinary 6 oz. medicine bottle so as to form a slope along one of the narrow sides; when the bottle is cool about 30 cubic centimetres of glycerin broth are run into each; the bottle is put into the incubator on its flat side, thus bringing the broth into contact with the lower part of the serum slope; the culture which has been sown on the serum above the level of the broth grows down the serum slope and has the opportunity of growing on to the broth. This is a good method of obtaining surface growths and of comparing the capacities of different strains of bacilli to grow on broth. The above descriptions of broth cultures apply to cultures grown in this way.

When flasks containing 200 cc. or more of broth are used and the medium is inoculated from another broth culture, surface growths have been obtained with several of the Group I cultures almost equal in luxuriance to those produced by the second group of cultures.

Group II.—The second group contains 48 viruses and 84 strains have been investigated.

The cultures in this group when cultivated upon serum sometimes quickly lose their vitality; the bacilli may have grown rapidly and well on the serum, but when only a month or six weeks old they have often failed to multiply when sown on to another serum tube.

These results illustrate the importance of using only young and vigorous cultures for sowing the test media; even when young cultures have been used the bacilli have often not grown on one or other of the glycerin media. Poor quality of the medium may be responsible in some cases for deficiency or absence of growth, but lack of vigour of the bacilli is I think a more important factor.

In the following instances where no growth took place lack of vigour of the bacilli and not poor quality of the medium was shown to be the cause of the bacilli not multiplying; several tubes of agar on which no growth had taken place were resown with a younger and more vigorous culture of the same strain; characteristically luxuriant growths were produced in each case.

The glycerin medium which has given the most constant results is glycerin-potato, and it has not been necessary to repeat the tests so frequently on this medium as on the others.

On serum all the cultures in the second group have produced luxuriant growths which, when the serum used was of a golden-yellow colour, exhibited a yellow pigment; with different varieties of serum the colour has varied from creamy-white to deep yellow.

When the serum contained glycerin the growths were much more luxuriant and were sometimes uniformly wrinkled or contained thick raised patches;

the growths were pigmented, but were generally not so deeply tinted as the serum cultures.

On glycerin agar thick creamy-yellow layers uniformly wrinkled or in places warty have been produced in every case.

On potato each virus has produced heaped-up yellow layers with a wrinkled or a warty surface; old cultures sometimes have a reddish-brown colour.

The growths on broth have not been uniformly luxuriant, but in the majority of cases thick creamy wrinkled pellicles covering the whole surface of the broth have been obtained; sometimes the greater part of the pellicle was thick yellow and wrinkled, while the rest was thin grey and translucent. In a few instances a uniform finely wrinkled greyish-white membrane has been produced.

SUMMARY.

The cultures from the 54 viruses considered in this report can, according to their cultural characters on the differential media, be divided into two groups.

The first group contains the viruses, six in number, which grow least luxurantly; these viruses grow like bovine tubercle bacilli and exhibit the same range of variation in their cultural characters; they are arranged in three classes which correspond exactly to the three classes into which bovine tubercle bacilli have been divided.

The second group contains 48 viruses, all of which have grown much more luxuriantly than the most easy growing of the cultures in the first group.

The cultures in the second group are distinguished from those in the first group by a more abundant growth on all media and the production of pigment.

THE GLYCERIN BROTH TEST.

Some additional observations have been made on the change of reaction produced in glycerin broth by tubercle bacilli growing upon its surface.

Fourteen experiments have been made with twelve viruses, five of which were human and seven bovine in their cultural characters on solid glycerin media.

The cultures were grown in flasks containing 200 cubic centimetres of 5 per cent. glycerin broth, the initial acidity of which varied from + 15 to + 20.

The reaction of the broth was again tested when all growth had apparently ceased in the flasks; no tests were made during the progress of the experiments.

In eight instances (seven viruses) the acidity of the broth was increased, the difference between the initial and the final acidity varying from + 4 to + 25.

Three of the cultures (H. 81. "P.W.", H. 86. "C.P." and P. IV, a swine virus) used in these experiments were typical human Group II organisms; two (H. 13. "A.D." (Calf 301) and H. 60. "W.B." (bronchial gland)) were mixtures of human and bovine tubercle bacilli, the former predominating; two (H. 19. "S.W." and H. 53. "D.H." (*a*)), according to their cultural characters and virulence have been classed among the bovine viruses (one typical and one attenuated).

These two cultures deserve special mention. One (H. 19) was derived from the mesenteric glands of a child aged $2\frac{9}{12}$ years; it was classed by Dr. Eastwood among the more easy-growing bovine viruses, and was shown by Dr. Cobbett to be equal in virulence to a bovine tubercle bacillus; the culture recovered from a heifer was tested on broth; it grew well and increased the acidity from + 17·5 to + 22 (*see* Second Interim Report, Appendix, Vol. III, p. 59).

The strain used in the recent experiments was recovered from a goat which had been inoculated subcutaneously with the original culture; it produced luxuriant growths in two broth flasks, and an increase in the acidity in one case from + 20 to + 45, and in the other from + 20 to + 26. The culture used in the two latter experiments had been four years in artificial cultivation, and when tested on rabbits was found to be much less virulent than the original culture.

The other culture (H. 53), derived from a case of lupus, is an attenuated bovine tubercle bacillus. It produced a moderately good growth on broth, and increased its acidity from + 20 to + 26.

In four instances the acidity of the broth was reduced, the reduction in acidity varying from — 2·5 to — 7; the viruses causing this change are all classed among the bovine viruses; two (H. 88. "E.L." and P. XIV, a swine virus) are typical bovine viruses; the others (H. 100 and H. 91) are attenuated bovine viruses.

The greatest reduction in acidity occurred in the case of H. 91. "H.S.", which produced the least amount of growth; the most luxuriant growth was produced by H. 88. "E.L.", and the acidity was lowered only three degrees, from + 18 to + 15.

In an experiment with virus H. 85. "H.B." the broth was alkaline to phenol-phthalein in the cold, but registered + 16 at 100° C., an increase of 1 over the original acidity; another strain of this virus caused in another experiment a diminution in the acidity of the medium.

Summing up the results, it is found that of the twelve viruses investigated seven have given the reaction, *i.e.*, increase in acidity, which Theobald Smith claims distinguishes the human from the bovine tubercle bacillus.

Of the seven, five have the cultural characters of human tubercle bacilli, but the other two have been classed among the bovine viruses according to their cultural characters on solid glycerin media and their virulence for animals.

The results with the last two viruses, therefore, do not support the statement of Theobald Smith that the bovine tubercle bacillus does not produce acid when grown upon glycerin broth.

The remaining five viruses, which have all been classed as bovine (typical or attenuated), caused a reduction in the acidity of the medium, which Theobald Smith states to be the characteristic reaction of bovine viruses. It is to be noted, however, that in four of the experiments the reduction in acidity is slight though the growths were moderately luxuriant.

If it were true, as Theobald Smith affirms, that the bovine tubercle bacillus causes an alkaline change only in the medium, the fall in acidity ought to have been considerably greater in those flasks in which good growths were obtained than in those in which the growth was scanty, as it is when no glycerin is present or when glucose is substituted for glycerin.

The results show that there is no such proportion, *e.g.* the good growth of H. 88. "E.L." reduced the acidity from + 18 only to + 15, whereas the scanty growth of H. 91. "H.S." caused the acidity to fall from + 18 to + 11.

The recent experiments, therefore, enable the following conclusions to be drawn:—

The bovine tubercle bacillus produces acid as well as alkali in glycerin broth when it grows well, the amount of acid produced depending in the main upon the luxuriance of the growth.

The glycerin broth test does not bring out distinct bio-chemical differences in the action of the bovine and the human tubercle bacillus on glycerin broth.

The same conclusions were arrived at as a result of my previous work on this subject.*

One hundred and eleven experiments were made with 75 strains, of which 37 were classed as bovine and 38 as human.

The results confirmed Theobald Smith in his general statement that the human tubercle bacillus, when grown upon the surface of broth, first causes a diminution in the acidity of the medium and then an increase, and that there are strains of bovine tubercle bacilli which steadily diminish the acidity of the medium. But they did not support the conclusions he drew from his experiments—that the differences he observed pointed to a difference in bio-chemical properties.

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* *See* 2nd Interim Report, Appendix, Vol. III, pages 53–62.

Comparing the initial with the final acidities, it was found that in the great majority of the broths on which the human tubercle bacillus had grown the final acidity was higher than the original; the extent to which the acidity was raised above that of the original varied greatly; in some cases it was only slightly higher, in others it was much higher. In several instances the final acidity was less than the original.

The final acidity of broth on which the bovine tubercle bacillus had grown was, with one exception, less than the original; the extent to which the acidity was reduced varied greatly, and was less with good growths than with scanty growths.

Thus in each group of experiments there were great variations in the differences between the initial and final acidities.

Arranged in numerical order, these differences formed a continuous series in which there was no gap to justify the assertion that there is an essential difference in the action of the two groups of mammalian tubercle bacilli on glycerin broth.

TABULAR SUMMARY OF THE RECENT EXPERIMENTS ON GLYCERIN BROTH.

Virus.	Initial Reaction of Broth.	Final Reaction of Broth.	Difference between Initial and Final Reactions.	Duration of Cultivation.	Characters of Pellicle.
H. 81. "P.W." ... Lung (Human).	+ 20	+ 24	+ 4	2½ months	Creamy wrinkled membrane of moderate thickness.
H. 86. "C.P." ... Meninges (Human).	+ 15	+ 28	+ 13	2 months	Thick creamy wrinkled membrane.
P. IV. (Human) ...	+ 17·5	+ 25·5	+ 8	2 months	
H. 13. "A.D." ... Calf 301 (Human and Bovine mixed).	+ 15	+ 29	+ 14	2 months	Thick creamy wrinkled membrane.
H. 60. "W.B." ... Bronchial Gland (Human and Bovine mixed).	+ 15	+ 25	+ 10	2 months	Thick wrinkled membrane.
H. 19. "S.W." ... Goat 11 (Bovine).	+ 20	+ 26	+ 6	2 months	Moderately thick greyish-white finely wrinkled membrane.
	+ 20	+ 45	+ 25	7 months	Thick creamy wrinkled membrane with raised colonies on the surface.
H. 53. "D.H." (*a*) ... Lupus (Attenuated Bovine).	+ 20	+ 26	+ 6	2½ months	Moderately thick greyish-white pellicle with moist warty surface.
H. 88. "E.L." ... Mesenteric Gland (Bovine).	+ 18	+ 15	− 3	5 months	Moderately thick creamy wrinkled membrane which sank.
P. XIV. (Bovine) ...	+ 17·5	+ 15	− 2·5	3 months	¾ surface covered with moderately thick opaque greyish-white patch.
H. 100. "R.S." ... Lupus (Attenuated Bovine).	+ 18	+ 14	− 4	4 months	Creamy wrinkled membrane of moderate thickness which sank.
		+ 12	− 6	7 months	
H. 85. "H.B." ... Lupus (O.M.) (Attenuated Bovine).	+ 15	+ 16 Alkaline at room temp.	+ 1	4 months	No note.
H. 85. "H.B." ... (Monkey 121).	+ 20	+ 14	− 6	3 months	Greyish-white not very thick finely wrinkled membrane, one third of which was studded with yellow warty nodules.
H. 91. "H.S." ... Lupus (Attenuated Bovine).	+ 18	+ 11	− 7	3 months	Three-quarters of surface covered with grey translucent membrane.

CHANGES IN REACTION PRODUCED IN GLYCERIN LITMUS MILK.

Further observations have been made on the changes produced in glycerin litmus milk by tubercle bacilli growing upon its surface. Litmus milk was experimented with in order to see whether it could be used as a substitute for broth in the method recommended by Theobald Smith for differentiating human and bovine tubercle bacilli. The results of the first trial of this medium are given in the Appendix to the 2nd Interim Report, Vol. III, page 85. It was found that the changes in reaction produced in the medium when glycerin was present corresponded exactly to those which took place in glycerin broth.

During the early stages of growth the milk acquires a deeper blue tint; then as the pellicle expands and thickens, the change in the alkaline direction is arrested and one in the opposite direction begins; the blue colour becomes less deep, the original colour is regained, and with further increase in the thickness of the pellicle the milk becomes pink; when the surface growth is very luxuriant the milk clots.

This type of reaction was exhibited by all human tubercle bacilli (Group II) when luxuriant growths were obtained; sometimes when the growth failed to cover the surface or was thinner than usual, the milk became red but remained unclotted.

Often the milk after turning pink became decolourised, the colour returning on standing at room temperature.

Bovine tubercle bacilli up to a certain stage brought about exactly the same changes in the colour of the medium; the colour was at first changed to a deeper blue, and then there was a change in the opposite direction, some milks acquiring a pinkish or reddish colour; none of the bovine tubercle bacilli used clotted the milk.

In some cases the final reaction of the milk was strongly alkaline: this occurred when there had been only slight increase of the inoculated material, or when the pellicle, though complete, was thin.

Tubercle bacilli grow well on glycerin milk, and form pellicles which are indistinguishable from those produced by the same bacilli on glycerin broth.

On milk without glycerin, as on broth without glycerin, growth was scanty, and an alkaline reaction was produced; in one case a human tubercle bacillus grew moderately luxuriantly, and the milk became slightly decolourised and acquired a faint pinkish tinge.

In the recent experiments the cultures have been grown in small bottles containing 30 cc. of milk, and also in flasks containing 200 cc.; the milk was coloured blue with litmus, and contained 5 per cent. glycerin, except in three special series in which different percentages were used.

Sixteen viruses with the properties of the human tubercle bacillus have been tested, and of these fourteen gave the reaction characteristic of this type of culture; the milk first became bluer than the control, then, as the growth increased, gradually acquired a pink colour, and finally clotted. In two instances the milk remained blue; in these cases the growth was thin, or only partly covered the surface.

Six viruses which have been classed among the bovine viruses have been tested; the growths produced by the majority of these viruses have been scanty, and the milk was much bluer than the control; in one instance (H. 53. "D.H." (*a*)), though a very good growth was obtained, the milk remained blue; in another (H. 88. "E.L."), half the surface was covered with a warty pellicle, and the milk was only slightly bluer than the control. Another of the viruses (H. 19. "S.W.") produced in three separate flasks good growths, and acid and clot; this was the bovine virus which produced a large amount of acid in glycerin broth.

On litmus milk without glycerin poor growths have been obtained, and the final reaction has in all cases been alkaline.

Three special series of experiments were made to ascertain whether the percentage of glycerin has any influence on the reaction.

The percentage of glycerin varied in two of the series from 5 to 0·5, and in the third from 5 to 0·25. The cultures used were all human (Group II). In milk containing 1 per cent. of glycerin and upwards, an acid reaction was produced in every case. Of the three flasks containing 0·5 per cent., the milk in one was slightly pink, in another it was of the same colour as the control, and in the other bluer than the control. The milk containing 0·25 per cent. glycerin was slightly bluer than the control.

To bring out the characteristic reaction of human tubercle bacilli, therefore, the milk must contain at least 1 per cent. of glycerin. Good growths were obtained on all the flasks, but better on the 1 per cent. and upwards than on the lower percentages.

The experiments with the milk medium show that glycerin milk coloured with litmus is a good substitute for glycerin broth in the Theobald Smith glycerin broth test, and the same general conclusions can be drawn from them as have been drawn from the experiments with glycerin broth.

The method with glycerin litmus milk has, however, advantages over that with glycerin broth; the changes in reaction can be observed without a chemical test, and the medium is not depleted by the repeated withdrawal of samples necessary for the carrying out of the glycerin broth test.

CHANGES IN REACTION PRODUCED IN GLUCOSE LITMUS MILK.

Twenty-four observations have been made on the change in reaction produced in glucose litmus milk by tubercle bacilli growing upon the surface; 15 viruses, four of which were bovine and 11 human (Group II), have been tested; some of the flasks contained 1 per cent., some 2 per cent., glucose.

One of the four bovine viruses produced only a small island of growth, and the colour of the milk was bluer than that of the control. Two others (H. 7. "C.M." and H. 88. "E.L.") grew well, and the milk in one case was much bluer, in the other only slightly bluer, than the control. The fourth virus (H. 19. "S.W.") in one experiment growing luxuriantly caused an acid reaction and slight clotting; in another it grew scantily, with the production of an alkaline reaction.

In ten experiments with human (Group II) cultures luxuriant growths were obtained, and the milks at the termination of the experiment were pink but not clotted; they clotted when heated to 100° C.

In the remaining experiments with human tubercle bacilli the milk remained blue, the depth of the colour varying with the amount of growth; with scanty growths the milk was very blue; with larger amounts the milk was sometimes only slightly bluer than the control, sometimes of the same colour.

These results are not in agreement with those obtained with glucose broth. In eleven experiments with glucose broth the acidity of the medium underwent progressive diminution, human and bovine tubercle bacilli reacting in the same way, and the greatest diminution, occurred in those flasks in which the most luxuriant growths were obtained; five of the viruses used were bovine and six human (Group II). (*See* App. 2nd Int. Report, Vol. III, page 82.)

In glucose milk there was first an increase in the alkalinity of the medium and then if growth was vigorous a swing in the opposite direction, the medium finally becoming pink; the reaction in glucose milk was thus similar to that produced in glycerin milk but the amount of acid produced was not so great as was shown by the almost invariable absence of clot in the former medium.

The addition of glucose makes both milk and broth very favourable media for the growth of the tubercle bacillus both human and bovine; on several occasions the growths produced by either kind of bacillus have been more luxuriant on glucose than on glycerin media.

The number of experiments with bovine tubercle bacilli have not been numerous enough for final conclusions to be drawn with regard to the action of the two kinds of bacilli, but in the few experiments performed there is nothing to indicate that bovine tubercle bacilli differ from human tubercle bacilli in their action upon milk containing glucose.

THE EFFECTS PRODUCED IN DIFFERENT SPECIES OF ANIMALS BY THE INOCULATION OF HUMAN TUBERCLE BACILLI AND BOVINE TUBERCLE BACILLI OF HUMAN ORIGIN.

INTRODUCTION.

The animals on which observations have been made are the calf, rabbit, guinea-pig, rhesus monkey, chimpanzee, goat, pig, horse, dog, cat, rat, mouse, fowl and parrot.

During the course of my work at Blythwood I have tested the action of the human tubercle bacillus on all the above species, and that of the bovine tubercle bacillus (of human origin) on five, namely the calf, the rabbit, the guinea-pig, the monkey, and the cat.

In the following report I have given general descriptions of the results of these inoculations and have compared the effects produced in each species by the human tubercle bacillus with those produced by the bovine tubercle bacillus. In those species in which only the human tubercle bacillus has been inoculated I have utilized for comparative purposes the results obtained with tubercle bacilli of bovine origin (*see* Appendix, 2nd Interim Report, Vol. I.).

Methods of Inoculation.

The subcutaneous method has been the main method of inoculation; the intravenous and intraperitoneal methods have also been employed.

A few feeding experiments with the human tubercle bacillus have been performed and further observations have been made on the dissemination of tubercle bacilli from the alimentary tract. The results of these experiments are considered after those of the inoculation experiments.

Estimation of Doses.

Cultures.—All the cultures used for inoculation have been grown on bovine serum without glycerin: the age limit of the subcultures was 3 weeks.

The doses of culture have been estimated volumetrically in the following way: the growth from the surface of each serum tube is scraped off with a platinum spatula and emulsified with a drop or two of sterile salt solution between sterilised ground glass plates; the thick resulting emulsion is diluted with salt solution and run into a sterile test tube; when all the growths have been dealt with in this manner, the emulsion is vigorously shaken and put aside for about half an hour to allow all the larger clumps of bacilli to settle.

The supernatant fluid is then decanted into a separate test tube and accurately graduated capillary tubes are immediately filled from it.

The tubes, after being sealed at both ends, are centrifuged until all the culture has accumulated at the bottom of each tube in the form of a small column.

The length of the column of bacilli and that of the combined columns of bacilli and fluid in each tube are then carefully measured; the average is taken and expressed as a ratio.

Having determined the relative volumes of bacilli and fluid in the emulsion, the amount of emulsion necessary for a given dose can be readily calculated; for example, if a dose of 10 milligrammes is required and the emulsion contains 1 volume of bacilli in 40, 0·4 cubic centimetre is taken; for a dose of 1 milligramme 0·4 cubic centimetre is diluted to 10 cubic centimetres and 1 cubic centimetre of the dilution inoculated; and so on for smaller doses. The doses are expressed in milligrammes when in reality cubic millimetres would be more correct.

Doses estimated in this way are strictly comparable with doses estimated gravimetrically as was shown in one case in which the culture was first weighed and then estimated by the volumetric method. This method of estimating culture doses possesses the following advantages; young serum cultures below a certain age can always be used, the suspensions are fine and small doses are accurately measured.

Emulsions.—In a few instances the number of bacilli in a dose of emulsion is stated; these numerical estimations were made in Dr. Eastwood's laboratory by the method described in Vol. I of the Appendix to the 2nd Interim Report, page 7.

INOCULATION EXPERIMENTS ON CALVES.

CALVES INOCULATED SUBCUTANEOUSLY WITH CULTURES OF BOVINE TUBERCLE BACILLI.

Tabular Summary, pages 167 *and* 168.

Cultures with the cultural characters of bovine tubercle bacilli isolated either directly or through the guinea-pig from the sputum of two persons with clinical signs of pulmonary tuberculosis (H. 127 and H. 128), and from four cases of primary abdominal tuberculosis in children (H. 69, H. 77, H. 88, and H. 89), have been tested subcutaneously on calves.

Five strains from the two sputum viruses and five strains from the four cases of alimentary tuberculosis have been inoculated into fourteen calves, the dose in each case being 50 milligrammes (except one calf which received 45 milligrammes).

Eleven of the calves died or were killed when dying in periods varying from 19 to 56 days and showed severe generalised tuberculosis.

Three of the calves after a short period of illness recovered, and were killed after 101, 105, and 105 days; two showed generalised progressive tuberculosis of moderate severity; the third slight retrogressive generalised tuberculosis.

In addition to the above, seven other strains with the cultural characters of bovine tubercle bacilli have been tested on calves; these strains were separated either by animal inoculation or by means of plate cultures from the four viruses H. 13. "A.D.", H. 49. "T.C.", H. 60. "W.B.", and H. 90. "I.P." (*See* Report on the investigation of these viruses, in Vol. III.)

With these strains eight calves were inoculated subcutaneously, the doses varying from 44 to 50 milligrammes.

Seven of the eight calves died or were killed when dying in periods varying from 21 to 52 days and showed general progressive tuberculosis. The remaining calf, inoculated with a strain of Virus H. 49. "T.C.", was killed when well after 107 days and showed slight generalised tuberculosis apparently retrogressive. (Another calf (one of the eight) subsequently inoculated with this culture died in 45 days of general tuberculosis.)

Summary of Effects produced.

The effects produced by the inoculation of these cultures were identical with those which followed the inoculation of tubercle bacilli isolated from bovine tuberculous lesions. These have been fully described in the Appendix to the Second Interim Report, but for the sake of ready comparison with the results obtained with bacilli of lesser virulence (Group II and lupus cultures), I will briefly detail here the general results of the subcutaneous inoculation of the virulent human cultures tested since the Second Interim Report.

Animals which die within six weeks of their inoculation become ill in the second or the third week, the first signs of illness being a rise in temperature and some roughening of the coat; gradually they lose appetite and flesh, the respirations become increased in frequency and finally laboured, and the animal dies presenting all the symptoms of an acute pneumonia.

The temperature rises on the 6th to the 10th day, reaches a maximum (40·6° to 41·5° C.) a few days later, and remains at a continuously high level until within a few days of death. In several cases there is a preliminary early rise of temperature often to a high level (in one case 41·4° C. on the third day), lasting a day or two and returning to the normal before the specific rise begins.

At the seat of inoculation of the culture a tumour soon forms, which gradually increases in size and may finally attain considerable dimensions, infiltrating the skin and the muscles beneath it and between it and the nearest glands. The tumour is at first uniformly hard, but in the fourth or fifth weeks has a softer doughy consistency in the central or thicker part; sometimes the skin over the tumour becomes fissured, serous fluid exuding, and may necrose, an irregular ulcer forming, the discharge from which quickly becomes foul. The prescapular gland is definitely enlarged at the end of the first week and gradually increases in size, sometimes measuring finally as much as 13 centimetres in length; other smaller glands in the neighbourhood may be felt to be enlarged, and there is often marked oedema of the dewlap and around the lower parts of the lesion and prescapular gland.

On post-mortem examination the lesion is found to be a mass of yellow caseo-necrotic substance intimately adherent to the skin and muscles; in the centre of the mass there is generally a series of small spaces filled with yellow serous fluid. The skin is always infiltrated with caseous tubercles in the deeper layers, and may in places be caseo-necrotic throughout its whole thickness, the epidermal layer then being fissured, necrosed and readily separable from the tissues beneath; this condition is followed by necrosis, softening and ulceration of the body of the tumour. The adjacent prescapular gland is much enlarged and composed throughout of dense pinkish-yellow caseo-necrotic substance containing calcareous grains in the peripheral parts of the gland; the capsule is much thickened. The rounded prepectoral gland and some of the cervical glands on the same side are often in a similar condition. The thoracic glands are much enlarged and show their cortices composed of firm grey tissue infiltrated with irregular yellow caseous patches or a caseous network; the medullary portions are congested and oedematous. The portal and frequently some of the mesenteric ileo-colic and coeliac glands bear a close resemblance to the thoracic glands, but are usually not so advanced in caseation; other lymphatic glands contain discrete caseous tubercles varying in size according to the duration of life and most numerous in the renal and lumbar glands.

The lungs are extensively consolidated, the cephalic and right middle lobes, and the antero-ventral portions of the caudal lobes being dark red and usually quite airless while the rest of the caudal lobes are diffusely mottled with congested and airless patches; the parenchyma of the lungs is closely beset with caseous tubercles which project from the surface of the consolidated lobes.

The liver also contains numerous caseous tubercles, those on the surface or under the capsule being flattened out and often 'mushroomed.' The spleen is enlarged and filled with yellow caseous nodules. The kidneys show in the cortices caseous tubercles always less numerous than in the lungs, liver and spleen; these tubercles are often elongated in a radial direction and sometimes extend throughout the whole thickness of the cortex; frequently one of the larger tubercles is found when the cortex is cut open to be surrounded by a crop of small tubercles; occasionally tubercles are seen in the medullary zones.

Caseating tubercles and nodules are always found on the omentum and pleura and in the walls of the intestines, and frequently in the gall-bladder, suprarenal bodies, heart and trachea, and occasionally in the eyes, thymus, testes and mamma.

Microscopical examination of smear preparations shows tubercle bacilli to be numerous in the lesions.

The size of the tubercles in the organs and glands varies with the duration of life of the animal.

In animals which live longer than six weeks but finally succumb the distribution of the disease is the same, but the lesions in the organs and glands are fewer and larger, more advanced in caseation, and more frequently contain calcareous grains. In the lungs nodules often coalesce, or hepatised patches become tuberculous, large caseating masses being formed which affect the whole or part of a lobule.

The temperatures of calves which survive three or four months exhibit intermediate variations between the typical curve resulting from the inoculation of bovine tubercle bacilli and that resulting from the inoculation of the human tubercle bacillus.

Summary of the lesions in calves in which the tuberculosis had become chronic :—

Two of the calves (Nos. 1249 and 1275, Viruses H. 69 and H. 89) which were killed when well after 3½ months showed general tuberculosis of moderate severity. The local lesions and nearest glands were masses of firm caseous gritty substance; the lungs contained fairly numerous miliary tubercles mostly calcareous, the spleen was closely beset with calcareous nodules, the liver contained moderately numerous miliary tubercles, the kidneys fairly numerous nodules or tubercles. The distribution of the disease in the glands and the intestinal tract was the same as in the more acute cases but the lesions were calcareous.

The most important features of these chronic cases were the absence of consolidation in the lungs and the affection of the serous surfaces. The costal and visceral pleura, the surfaces of the diaphragm, the omentum and the peritoneum all showed tuberculous or "Perlsucht" growths in the various early stages of development.

Two other calves (No. 1413 and 1569, Viruses H. 49 and H. 127) were killed when well after 3½ months and each showed slight generalised retrogressive tuberculosis. Besides the local disease there were scattered calcareous tubercles in the lungs, liver and spleen; the thoracic glands were beset with calcareous tubercles, and there were calcareous tubercles in some of the abdominal and neck glands of Calf 1413, and calcareo-caseous tubercles in all the lymphatic glands of Calf 1569.

In these chronic cases tubercle bacilli were much less numerous than in the more acute cases.

CALVES INOCULATED SUBCUTANEOUSLY WITH CULTURES OF HUMAN TUBERCLE BACILLI.

Tabular Summary, pages 168–170.

Seventeen strains of culture from fifteen viruses which grow luxuriantly on artificial media have been inoculated subcutaneously into calves.

Altogether twenty calves have been used, the doses varying from 45 to 200 milligrammes.

They were all killed in good health in periods varying from 90 to 138 days and showed slight retrogressive tuberculosis; in seven out of the twenty calves the disease was limited to the site of inoculation and nearest glands, while in the rest there were in addition to the local disease a few minute retrogressive tubercles in some of the organs and glands.

Results similar to these were obtained by Cobbett, who found minute disseminated lesions in 47 of the 92 calves inoculated by him with Group II bacilli.

The subcutaneous inoculation of human bacilli of Group II is rarely followed by serious disturbance of health, usually there is in the second or third weeks some roughening of the coat with loss of appetite and perhaps slightly increased respiration; these signs of ill-health quickly disappear and during the remaining period of the experiment the general condition of the calf is normal.

The temperature rises on the 8th to the 12th day, reaches the maximum (40 to 41° C.) in a few days and then gradually falls to the normal, the pyrexial periods varying from 8 to 23 days; sometimes for a few weeks after the fall there is very slight irregular pyrexia. Frequently the temperature is only slightly raised, not reaching 40° C., and for short periods of from two to thirteen days.

The tumour at the seat of inoculation grows to a moderate size; at first hard, it soon begins to soften and then assumes a globular shape, becoming pendulous. The skin over it frequently breaks down and when this occurs in the early part of the experiment the contents of the tumour are gradually discharged, the lesion finally being represented by a mass of thickened skin and scar tissue.

The prescapular gland undergoes enlargement the amount of which varies in different cases; it attains its maximum in the 4th or 5th weeks and then diminishes, the larger glands sometimes becoming definitely cystic. One of the prepectoral glands can often be felt to be enlarged during life.

Occasionally the local and general effects are much more severe and cases have occurred in which it would not have been possible during the first few weeks to have declared whether a slightly virulent or a virulent culture was being dealt with; but uncertainty is not of very long duration; the severe symptoms quickly abate, the temperature falls, the tumour which is probably a large one becomes cystic, the nearest gland begins to diminish in size, and the animal apart from the local conditions resumes its normal state.

Summary of Effects produced.

The following is a description of the lesions found at the post-mortem examination of calves inoculated subcutaneously with cultures of human tubercle bacilli (doses 50 milligrammes and upwards).

The local lesion is sometimes a cyst with fibrous walls lined internally with granulation tissue and containing caseo-pus and perhaps firm caseous masses; the cavity of the cyst is often crossed by fibrous trabeculae. At other times the lesion is a mass of greatly thickened skin and scar tissue, the skin showing a funnel-shaped depression, the site of an ulcer. The latter is the final condition of a local lesion when the skin breaks down, and in the above series of calves every intermediate stage between the intact cyst and the mass of scar tissue has been met with.

The muscles under the tumour are never infiltrated as is the almost invariable rule with virulent viruses, the caseous substance always being completely encapsuled in fibrous tissue.

The prescapular gland shows great variation in size and varies in appearance on section.

Sometimes it is normal in size or only slightly enlarged and shows no sign of tuberculosis or contains a small calcareous or calcareo-caseous nodule or two and some minute calcareous foci; or in a gland three or four times the normal in size there may be two or three large firm caseo-calcareous masses replacing more than half of the gland tissue; occasionally it is moderately large and caseo-necrotic practically throughout and is then often partially softened. When there are distinct tuberculous masses or nodules these are generally situated deeply in the substance and separated from the capsule by a zone of normal gland tissue; the nodules often show in the centre a mass of dense white cicatricial tissue.

The rounded prepectoral gland may be wholly or partly caseo-calcareous or may contain only a calcareous tubercle or two, and one of the cervical glands near the lesion may be tuberculous.

In about 50 per cent. of cases no tuberculous lesions are found beyond the nearest glands, in the rest a few calcareous tubercles are found in the lymphatic glands of the body and scattered tubercles in the lungs and suprarenal bodies; the thoracic glands and glands along the alimentary tract most frequently contain tubercles which are sometimes aggregated together to form irregular patches. The tubercles are irregular yellow and vary up to a millet seed in size; they are often so very minute as to be visible only through the capsule in the uncut gland. The tubercles in the lungs are often glassy and resemble a small seed pearl, when crushed they produce a chalky powder; other tubercles are grey and fibrous and some have a minute yellow gritty centre; tubercles in the suprarenal bodies are larger than elsewhere and are usually caseous and calcareous. No lesions have been found in the spleen, liver or kidneys.

Microscopically, tubercle bacilli are scanty or absent in the disseminated lesions produced by Group II viruses.

The effects produced therefore by the cultures which grow luxuriantly are very different from those produced by bovine cultures. Whereas the latter almost invariably cause severe and usually fatal tuberculosis in doses of 50 milligrammes, the former in equivalent or larger doses are incapable of producing anything more than a limited retrogressive tuberculosis.

CALVES INOCULATED SUBCUTANEOUSLY WITH EMULSIONS OF HUMAN TISSUES.

Tabular Summary, page 166.

Four calves have been inoculated subcutaneously with emulsions made from human tuberculous tissues; two were inoculated with an emulsion of the tuberculous lung of H. 80. "D.M." (doses 195,000,000 tubercle bacilli), and two with an emulsion of the tuberculous lung of H. 81. "P.W." (doses 3,035,000,000 tubercle bacilli).

The results are in agreement with the results of the inoculation of cultures from the same material, retrogressive tuberculosis only being produced in each case.

All the calves were killed in good health in periods varying from 93 to 366 days; one had local tuberculosis only, another had local tuberculosis and a single tubercle in the lung; in a third, besides the local lesion and disease of the nearest glands, there were a few calcareous foci in the mesenteric glands; the fourth showed generalised tuberculosis exceptionally widespread for bacilli of this group; there were tubercles in the lungs, liver, spleen, and suprarenal body (one tubercle), and the walls of the small intestine and nearly all the lymphatic glands were affected, the peripheral lymphatic glands containing caseous and softened gritty tubercles and nodules; pure cultures of tubercle bacilli were isolated from the prescapular, mediastinal, ileo-colic, and ischiatic glands, and all resembled the culture inoculated.

CALF INOCULATED INTRAVENOUSLY WITH CULTURE OF HUMAN TUBERCLE BACILLI.

One calf (No. 1385) has been inoculated intravenously with culture from Virus H 104. The dose was 5 milligrammes, and the calf died in 29 days of acute tuberculosis; the disease was most severe in the thorax, the lungs being extensively hepatised and closely beset with minute tubercles; the thoracic glands were enlarged and in a state of early caseation, and there were minute tubercles in the heart, liver, and one of the kidneys.

Death was due to the irritant action of the injected tubercle bacilli on the lung tissue, causing pneumonic consolidation.

A calf inoculated subcutaneously with 50 milligrammes of the same culture developed slight retrogressive tuberculosis only.

SUMMARY.

Since the 2nd Interim Report 22 calves have been inoculated with cultures of bovine tubercle bacilli derived from cases of human tuberculosis.

The cultures were all grown upon serum, and the dose inoculated was 50 milligrammes in eighteen cases, and 44 to 48 milligrammes in four.

Eighteen of the calves died, or were killed when dying of general tuberculosis, in periods varying from 19 to 56 days.

The other four were killed in apparent good health in from 101 to 107 days; two of these showed general progressive tuberculosis of moderate severity, the other two had a mild form of generalised tuberculosis, the lesions being definitely retrogressive in character.

The proportion of calves inoculated with 50 milligrammes of bovine culture which lived beyond the 90 day limit is higher in this series than in other series of calves inoculated with the same dose.

Out of 36 calves inoculated with 50 milligrammes of culture isolated from bovine tuberculous lesions, 34 died or were killed when dying of general tuberculosis in periods varying from 18 days to 76 days, one was killed after 92 days and showed moderately severe general progressive tuberculosis, the other, killed after 54 days, had only slight general tuberculosis. (*See* Appendix to 2nd Interim Report, Vol. I.).

Eight calves inoculated with bovine cultures of porcine origin died or were killed when dying of general tuberculosis within 50 days.

Out of 43 calves inoculated by Cobbett with 50 milligrammes of bovine culture of human origin, 42 died or were killed when dying of general tuberculosis in periods varying from 21 days to 63 days. One lived beyond the 90 day limit, and when killed in apparently good health showed slight general tuberculosis. (*See* Appendix to 2nd Interim Report, Vol. II.).

These results, which are set out in the table below, show that 50 milligrammes of a serum culture of bovine tubercle bacilli gave rise in 93·58 per cent. of the cases to general progressive tuberculosis fatal within 76 days, in 2·75 per cent. of the cases to general progressive tuberculosis not fatal within 90 days, and in 3·67 per cent. to slight general tuberculosis, not progressive.

The production of slight general tuberculosis in 4 of the calves (3·67 per cent.) was due to high resistance of the individual calf, and not to low virulence of the culture, since the same strains of culture used for these calves produced in other calves rapidly fatal tuberculosis, and in rabbits fatal tuberculosis of the usual acute type.

Twenty calves have been recently inoculated with cultures of human tubercle bacilli, the doses varying from 45 to 200 milligrammes. All were killed in good health in from 90 days to 138 days. In seven the disease was limited to the site of inoculation and the nearest glands, while in the rest there were, in addition to local disease, a few minute disseminated lesions.

TABLE GIVING THE RESULTS OF THE INOCULATIONS IN CALVES OF 50 MILLIGRAMMES* OF CULTURE OF BOVINE TUBERCLE BACILLI OF BOVINE, PORCINE, OR HUMAN ORIGIN.

—	Died (or killed when dying) of general tuberculosis.		Killed in apparent good health after 90 days (1 after 54 days).
	Within 50 days.	In 51 to 76 days.	
Cultures of Bovine origin	32	2	1 (54 days, G.T. not severe). 1 (92 days, progressive G.T.).
Cultures of Porcine origin	8	—	—
Cultures of Human origin ... ... (Experiments published in 2nd Interim Report.)	40	2	1 (90 days, slight G.T.).
Cultures of Human origin ... ... (Recent experiments.)	10	1	1 (101 days, progressive G.T.). 1 (105 days, progressive G.T.). 1 (105 days, slight retrogressive G.T.).
Cultures of Human origin ... ... (Recent experiments—with cultures isolated from mixed cultures.)	6	1	1 (107 days, slight retrogressive G.T.).
Total	96	6	7 { 3 progressive G.T. 4 slight G.T., not progressive.

INOCULATION EXPERIMENTS ON RABBITS.

INTRODUCTION.

Experiments recorded in the Appendices to the Second Interim Report showed that the rabbit differentiates between bovine and human tubercle bacilli in the same way as the calf.

Tubercle bacilli which were highly virulent for the rabbit always proved highly virulent for the calf, and tubercle bacilli which produced in the rabbit retrogressive tuberculosis never produced in calves more than a limited retrogressive tuberculosis.

The important fact was established that with the rabbit alone one is able to distinguish with certainty the bovine from the human tubercle bacillus. In the investigation of cultures isolated since the Second Interim Report, therefore, the rabbit has been employed as the standard animal for determining the virulence of a culture.

Among the cases recently investigated were several of general tuberculosis in children, and cultures from different lesions in the body were isolated to ascertain whether more than one type of bacillus was concerned in the production of the disease. The routine testing of calves with all the strains isolated would have entailed the use of a large number of these animals, thus limiting considerably the number of cases it would have been possible to investigate, and the work in other directions. It was decided, therefore, to be unnecessary to test in every instance on calves strains which grew luxuriantly and produced in rabbits limited retrogressive tuberculosis when inoculated subcutaneously.

On the other hand it was decided to test on calves all cultures which caused more severe tuberculosis in rabbits than is usually produced by the human tubercle bacillus. This plan was adopted to insure the testing on calves of all cultures of the bovine tubercle bacillus and of all cultures in which there might be a mixture of human and bovine tubercle bacilli.

The Viruses Investigated. — 83 strains from 54 different viruses six of which yielded cultures with the cultural characters of the bovine tubercle bacillus, have been tested on rabbits; altogether 380 rabbits have been inoculated with these original strains.

The Methods of Inoculation.—Each of the strains has been inoculated into two or more rabbits. Two methods of inoculation have been systematically employed, the intravenous and the subcutaneous; the intraperitoneal method was also used for some of the early cultures, but was abandoned when it was found that the other severe method of inoculation, the intravenous, was greatly superior, and did not possess any of its disadvantages.

The intravenous method gives quicker indication of the virulence of a culture than the subcutaneous, but when large doses are employed may lead to confusion. The human tubercle bacillus in a dose of 1 milligramme occasionally does cause fatal tuberculosis resembling that produced by bovine tubercle bacilli, and this might lead an inexperienced observer to an erroneous conclusion.

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* In eight cases the dose was slightly less than 50 mg. (from 43 to 48 mg.).

This risk of error is avoided if a smaller dose of culture be inoculated, the intravenous method then differentiating just as sharply as the subcutaneous between bacilli of high and low bovine virulence.

The intravenous inoculation of a small dose, 0·1 or 0·01 milligramme, and the subcutaneous inoculation of a large dose, 10 milligrammes or more, have been found to be of about equal value in bringing out clearly differences in virulence.

The subcutaneous method has, however, the disadvantage that the local lesion may ulcerate and infective material may be discharged and disseminated as dust to other animals or to the attendants. This danger is not so great when the bacilli are inoculated into the subcutaneous tissues of the back, as ulceration is not so liable to occur in this region. This site of inoculation was therefore chosen instead of the subcutaneous tissues of the abdomen. Inoculation into the subcutaneous tissues of the back has the additional advantages that one avoids the danger of immediate or mediate infection of a serous cavity, and the lesion is in a situation which admits of ready inspection.

This method of introduction gives more acute results than inoculation into the subcutaneous tissues of the abdomen; the experiments with bovine tubercle bacilli showed that rabbits inoculated in this way succumbed on an average much sooner than rabbits inoculated under the skin of the abdomen, the average period for 14 of the former inoculated with 1 milligramme was 59·25 days, while that for 35 of the latter after a similar dose was 75·5 days.

In order to gain preliminary information as to the virulence of a virus, emulsions of the original material have in many instances been inoculated into rabbits.

Thirty-two viruses have been tested in this way. Of these four produced acute infections in all the rabbits inoculated, twenty-three caused either limited retrogressive tuberculosis or no tuberculosis at all and five produced severe general tuberculosis.

From the five viruses which produced fatal tuberculosis in the rabbits cultures identical with bovine tubercle bacilli were isolated. The cultures obtained from the other viruses, the original material of which produced either no disease or slight tuberculosis in the rabbits, were easy-growing and slightly virulent for the rabbit.

RABBITS INOCULATED WITH CULTURES OF BOVINE TUBERCLE BACILLI.

Tabular Summaries, pages 179–183.

INTRAVENOUS INOCULATIONS.

Sixteen rabbits have been inoculated intravenously with nine strains from the six viruses with the cultural characters of the bovine tubercle bacillus.

Six of the rabbits received 1·0 milligramme, eight 0·1 milligramme, and two 0·01 milligramme.

All the rabbits (except two which died prematurely) died of general tuberculosis, those inoculated with 1·0 mg. in from 10 to 20 days (average 15·4 days); those with 0·1 milligramme in from 15 to 25 days (average 20·1 days); and those with 0·01 milligramme in from 24 to 30 days (average 27·0 days).

Rabbits inoculated with 1·0 mg. of virulent culture sometimes die within a fortnight of their inoculation of a very acute disease; in these cases the lungs are solid with aggregated grey tubercles, the bronchial glands are oedematous, the spleen is enlarged, and there are indefinite foci in the liver and kidneys and microscopically numerous tubercle bacilli all over the body.

When rabbits inoculated with 1·0 milligramme live as long as rabbits inoculated with 0·1 milligramme the naked eye features of the disease are essentially the same.

I will describe the characters of the disease in animals which have died about three weeks after inoculation.

The animals lose weight and at death are much emaciated. The lungs fill the chest almost completely and do not collapse, they are congested firm and beset with grey miliary tubercles with caseous centres so closely as to cause complete consolidation of the anterior lobes and partial consolidation of the posterior. The bronchial (or more properly the tracheal) glands are enlarged congested and oedematous, and show irregular caseous patches in the cortices. The spleen is swollen dark red and speckled with minute grey foci which are most plainly visible just under the capsule. The liver is closely peppered with minute grey foci. There is a varying number of grey miliary tubercles in the cortices of each kidney. The coeliac and portal glands contain caseous tubercles and there are often minute caseous tubercles in every other lymphatic gland. There are frequently tubercles on the endocardium and in the heart muscle, and pale spots suggesting tubercles are seen in the rib marrow. Tubercle bacilli are numerous in all lesions and are found in considerable numbers in the marrow.

With the longer duration of life of animals inoculated with 0·01 milligramme of culture there is a corresponding increase in the size of the lesions. In rabbits which have lived from 24 to 30 days the lungs are very large and completely fill the chest; they do not collapse and are composed almost throughout of irregular grey caseating nodules formed by aggregated tubercles; sometimes the anterior lobes and parts of the posterior are uniformly solid grey and infiltrated with caseous foci or small irregular caseous patches. The tracheal glands are enlarged and generally contain large caseous patches. The spleen is greatly enlarged and closely beset with yellow submiliary caseous tubercles. The liver is enlarged pale and shows distributed throughout its substance numerous greyish-white tubercles. The cortex of each kidney contains numerous miliary tubercles with caseous centres. The coeliac and portal glands are beset with coalescing caseous tubercles and usually every other lymphatic gland contains definite caseous tubercles. There are also tubercles in the heart and intestines and sometimes the bone-marrow is packed with caseous tubercles.

INTRAPERITONEAL INOCULATIONS.

Eleven rabbits have been inoculated intraperitoneally with cultures from four of the virulent viruses, six with 1·0 milligramme, and five with 0·1 milligramme. One of the rabbits died of pseudotuberculosis in seven days. Another died in 112 days of chronic general tuberculosis, the injection having been made into the stomach; the others died of tuberculosis in periods varying from 14 to 49 days, the duration of life after 1·0 milligramme varying from 14 to 19 days (average 19·2), that after 0·1 milligramme from 22 to 49 days (average 27·2).

The disease produced by 1·0 milligramme of culture was very acute; the omentum was thickened, the peritoneum, parietal and visceral, was closely studded with tubercles, and the organs were affected with a miliary tuberculosis in a manner closely resembling that in intravenously inoculated animals which had lived an equal length of time. 1·0 milligramme intraperitoneally is about equal in its effects to 0·1 intravenously. Similarly in the animals inoculated intraperitoneally with 0·1 milligramme the characters of the disease in the organs were essentially the same as those in animals inoculated intravenously with 0·01 milligramme. The lungs, however, were never so severely affected in intraperitoneally inoculated animals as in intravenously inoculated animals; the tubercles were fewer, and there was less consolidation.

The intraperitoneal inoculation of doses of 1·0 or 0·1 milligramme of virulent culture is equivalent, therefore, in its effects to the intravenous inoculation of about one-tenth the number of bacilli.

Intraperitoneal inoculation cannot be recommended as an exact means of estimating virulence on account of the risk of injecting some of the culture emulsion into a hollow viscus, or as occurred occasionally in the experiments with bovine tubercle bacilli, into the subperitoneal tissues or muscles of the abdomen.

SUBCUTANEOUS INOCULATIONS.

Cultures from each of the six virulent human viruses have been tested subcutaneously on rabbits. As stated in the Introduction, the site of inoculation in these experiments was the subcutaneous tissues of the back between the scapulæ.

Forty-eight rabbits have been inoculated, the doses varying from 50 milligrammes to 1 milligramme. Forty-four rabbits died of uncomplicated general tuberculosis, the duration of life varying from 29 to 117 days; four died from other causes.

The subcutaneous inoculation of doses of 50 and 10 milligrammes of culture is sometimes followed by a very acute and rapidly fatal tuberculosis.

Five rabbits, four inoculated with 10 milligrammes or more and one with 3·3 milligrammes, died within five weeks and showed besides a large caseous lesion and caseation of the nearest glands, a miliary tuberculosis of the lungs, liver, spleen, and kidneys, caseous nodules in the bronchial glands, and caseous tubercles in most of the other lymphatic glands; the condition of the organs, especially of the lungs, closely resembling that following the intravenous inoculation of 0·01 milligramme of virulent culture.

In animals which die in from six to eight weeks the lungs are usually extensively tuberculous, and contain extremely little functional lung tissue; the cephalic lobes are generally solid and airless, and composed of reddish-grey tissue infiltrated with irregular caseous foci of various sizes; portions of the caudal lobes chiefly the antero-ventral parts resemble the cephalic, while the rest of these lobes contain caseating tubercles mainly aggregated together into groups with congested and emphysematous lung tissue in between.

Sometimes the lungs do not present this tuberculous pneumonic type of disease, but contain caseating tubercles, some discrete but mainly aggregated together into irregular nodules; in the posterior parts of the caudal lobes there may be large caseous areas, but the lungs as a whole, when removed from the thorax, are not so bulky as in the pneumonic type, and contain more crepitant lung tissue. (In one case (No. 2362, H. 128. "D.D." (*a*)) all the tubercles remained discrete except in the cephalic lobes where there were some pneumonic patches, and presented retrogressive characters.)

The bronchial glands are enlarged and caseous almost throughout.* The spleen usually contains moderately numerous yellow caseous tubercles ranging up to a millet seed in size. The liver is often normal, but may show submiliary grey or yellow tubercles. The kidneys show in the cortices numerous nodules ranging from about 1 to 3 millimetres in diameter; they are grey with caseous centres, and the larger ones often project from the surface, and on section have a wedge-shaped outline. The portal and coeliac glands contain caseous nodules, and generally every other lymphatic gland in the body shows caseous tubercles. Tubercles are also occasionally found in the heart, thyroid body, submaxillary salivary glands, suprarenal bodies and intestines. The omentum frequently contains tubercles.

In animals which live longer than eight weeks, three months or more, and then succumb, the disease tends to be confined internally more and more to the lungs and kidneys. The liver is frequently normal. The spleen may contain a caseous tubercle or two, but is usually normal. The lungs are large and very heavy, and composed almost throughout of masses of caseating tuberculous tissue; caseation is more advanced than in the five to eight weeks animals, and often the masses are practically uniformly caseous; in chronic cases the caseous substance undergoes softening and perhaps cavitation, or calcareous grains form in it.

The kidneys usually contain in the cortices numerous firm caseating nodules varying in size; the larger ones project prominently from the surface and are generally adherent to the capsule; typical ones extend through the cortex into the medulla, are conical in form and are readily extracted from the kidney substance leaving a funnel shaped hole; occasionally very large nodules one or more centimetres in diameter are met with. In very chronic cases there may be caseous streaks radiating from the apex of the papilla and a few of the calyces may contain caseo-pus.

Occasionally joints, intestines, thyroid body and eyes are affected. Lymphatic glands other than those adjacent to the local lesion are usually normal; a bronchial gland, generally the one on the side of the lesion, may be caseous and there may be calcareous grains in the portal and coeliac glands. The scapular glands are always enlarged and often caseous throughout, the axillary glands are partly caseous and one or two of the vertebral glands are often caseous. The local lesion in early cases is a mass of firm caseous substance infiltrating the muscles, in later cases it is usually softened and often ulcerated.

RABBITS INOCULATED WITH CULTURES OF HUMAN TUBERCLE BACILLI.

Tabular Summaries, pages 184–219.

INTRAVENOUS INOCULATIONS.

Cultures with the cultural characters of the human tubercle bacillus obtained from forty-five viruses have been inoculated intravenously into rabbits. The results with the two viruses which were shown to be mixtures are considered elsewhere. The doses employed for testing 19 of the viruses were 1·0 and 0·1 milligramme (in one case 0·1 milligramme only was given, and in a few cases 0·01 milligramme in addition to 1·0 and 0·1 milligramme) while each of the other cultures, all from sputum, was inoculated in doses of 0·1 milligramme and 0·01 milligramme. Altogether 121 rabbits have been inoculated intravenously, 33 with 1·0 milligramme, 55 with 0·1 milligramme, and 32 with 0·01 milligramme.

Nine of the rabbits inoculated with 1·0 milligramme of culture died within 28 days, twelve within three months, and six after a longer period; in the majority of these cases death was undoubtedly due to tuberculosis and in two the disease bore a striking resemblance to that produced by bovine tubercle bacilli; the remaining six rabbits were killed after more than three months, but one of these (1205, H. 75) would probably have died in a few weeks as it had lost weight and the disease in it was moderately severe.

A good many of the rabbits inoculated with 0·1 milligramme died prematurely or from intercurrent disease, such as pseudo-tuberculosis or psorospermosis. After excluding these there remain 40, fifteen of which died apparently from tuberculosis, six within 28 days, three within three months, and six after a longer period; the rest, twenty-five in number, were killed in good health after periods varying from 94 to 232 days.

The disease in the four that died within 28 days was in no case so severe as that produced by bovine tubercle bacilli within the same period. Of the rabbits inoculated intravenously with 0·01 milligramme not one died of tuberculosis; seven did die but in four of these death was due to intercurrent disease and in three the cause of death was not apparent; the rest were killed in good health after three or more months.

The rabbits have shown great diversity in the extent of the disease in individual organs and in the distribution and the character of the lesions produced. All these have varied with the duration of life of the animals and with the dose, the most severe effects usually being produced by the larger doses. The larger doses, as stated above, have not always caused the death of the animal, and moreover in animals which survive two or three or more months the differences in the characters of the disease are due more to the duration of life than to the dose.

The most convenient way therefore of describing the results is according to the duration of life, and for this purpose the animals have been divided into three groups, the first group containing those animals which have died within a month, the second those which have died within three months and the third those which have died or been killed after periods longer than three months.

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* These glands in the rabbit are placed about midway on the thoracic trachea. When virulent tubercle bacilli are inoculated in the subcutaneous tissues of the back, they almost invariably become enlarged and extensively caseous; this result demonstrates that the bronchial or tracheal glands of the rabbit are not, as in most other animals, purely regional glands of the lung.

Results in animals which have died within a month.

The disease in one of the rabbits, No. 1212, which died 28 days after 1 milligramme of Virus H. 78, was very severe. The lungs were almost completely consolidated and beset with miliary caseating tubercles, there were numerous minute tubercles in the heart muscle, liver, and kidneys, the bronchial glands contained caseous patches, the spleen was normal; only in the latter respect did the disease in this animal differ from that produced by bovine tubercle bacilli.

Another strain of the same virus in a dose of 1 milligramme killed a rabbit No. 1215 in 18 days; the disease in this animal was in every respect identical with the acute disease produced by bovine tubercle bacilli.

Each of these strains caused in a calf inoculated subcutaneously with 50 mg. slight retrogressive tuberculosis.

Acute disease, but less severe than in the above two cases, was produced in Rabbits 1635, 2359, 2296, 2263, 2317, by cultures from the five Viruses H. 93, H. 133, H. 136, H. 139, and H. 140, while in each of the rabbits inoculated with a smaller dose of the same strains only slight retrogressive tuberculosis was produced.

The cultures which produced acute results when inoculated intravenously did not possess any greater power of producing tuberculosis when inoculated subcutaneously than other Group II cultures; the high virulence exhibited by them when inoculated intravenously may be referred to stronger action than usual of the toxins produced by the bacilli; this is the most probable explanation in at least one virus (H. 78. "O.D.") since the rabbits inoculated intraperitoneally with the same strains also succumbed to acute disease.

Several rabbits died within 28 days from causes other than tuberculosis. In these cases the lungs were crepitant and contained minute discrete tubercles evenly distributed; in some of the cases no other organs showed any visible lesions, in others there was enlargement of the spleen, minute foci in the liver or in the kidneys, and occasionally caseous foci in the bronchial glands. Tubercle bacilli were often found in tissues (organs and marrow) in which there were no macroscopic lesions.

The even distribution of lesions in the lungs of rabbits which die within a few weeks of their inoculation, and their irregular distribution in the lungs of rabbits which survive several months, show that tubercles in the rabbit often undergo complete absorption.

Results in animals which die within three months.

Fourteen animals have died within three months; ten unquestionably died of tuberculosis, the others died from other causes not in all cases apparent. I have subdivided this group into two, and will first describe the appearances in animals which have died of tuberculosis within 45 days.

Five rabbits died in periods varying from 33 to 45 days and showed miliary tuberculosis. The lungs were for the most part crepitant and collapsed well; they contained numerous miliary tubercles with caseous centres usually larger and more numerous towards the posterior parts of the caudal lobes and in the thin margins; the thin parts of the cephalic lobes and the thin margins of the caudal usually showed reddish-grey patches of consolidation in which caseous foci were seen. The bronchial glands were enlarged and contained caseous patches or foci. The liver and spleen in one or two cases were normal, in the others they contained discrete tubercles. The kidneys showed grey tubercles with opaque centres in the cortex and in a few cases caseous tubercles in the medulla. Caseous tubercles were often found in the abdominal and peripheral lymphatic glands and in the muscles, and tubercles were sometimes seen in the heart. A few animals died within 45 days of other causes; in these the tuberculous disease was confined usually to the lungs and kidneys which contained scattered discrete tubercles.

In the second subdivision there are six rabbits which died of tuberculosis in periods varying from 50 to 85 days.

In each of these animals the lungs were extensively tuberculous and more severely affected than any of the other organs; they collapsed only partially and were largely composed of firm tuberculous tissue. The tuberculous tissue had a characteristic arrangement; the anterior lobes were usually completely consolidated or showed a small amount of crepitant lung tissue around the root of the bronchi or along the dorsal border; in the caudal lobes the thin margins for a varying depth and portions or the whole of the dorsal surfaces were tuberculous; section of the latter showed that the tuberculous areas were generally quite superficial layers of variable but usually of no great thickness; these solid areas were sometimes advanced in caseation having a yellowish-white colour, sometimes grey or reddish-grey and beset with irregular caseous foci, and the pleura covering them was generally very vascular; the rest of the caudal lobes was crepitant and contained discrete caseating nodules and tubercles.

The bronchial glands were sometimes caseating. The kidneys showed on the surface a number of minute pits and in the cortices a varying number of caseous tubercles with grey margins; on section in the medulla there were scattered soft caseous tubercles and in some cases long caseous streaks sometimes extending as far as the apex of the papillary zone; caseo-pus was found in some of the calyces of one kidney. In most of the rabbits the disease was confined to the organs above-mentioned; in one case there were tubercles in the liver, muscles, and some of the lymphatic glands.

Animals which have died or were killed after periods exceeding three months.

This group contains the great majority of the animals inoculated intravenously. Many of the rabbits were allowed to live a long time, four months and longer, in order to see if they would eventually succumb to tuberculosis. The majority of the animals were killed in good health and most of them had increased in weight, a few however had lost weight. The others died of a chronic disseminated tuberculosis exhibiting certain special features which will be described below.

Rabbits which have lived several months after intravenous inoculation, but which will eventually die, present a very characteristic appearance during life and can easily be distinguished from other animals in the same cage; they have usually lost or not increased much in weight and are very emaciated looking; the coat is rough, the fur on the head especially standing straight up, the animal is listless, separates itself from its fellows and eats very little food; often there is a purulent discharge from the eyes; the cornea is sometimes opaque and vascularised, and tubercles can be seen in the iris or yellow nodules at the corneo-sclerotic junction; in these cases the eyelids are thickened.

The character of the disease found in the animals included in this group has varied very greatly.

The following description of the lesions, which is more general than in the first two groups on account of the larger number of animals concerned, is arranged according to the organ affected.

Lungs.—The lungs may be free from lesions or show a varying number of scattered fibrous or calcareous tubercles or small grey nodules showing caseous foci (in this series the lungs were normal in one case and contained only one tubercle in two); in addition to discrete tubercles there are often small irregular grey patches containing caseous foci in the thin margins of the lungs or thin superficial grey caseating patches on the dorsal surfaces of the caudal lobes, or instead of the latter, patches composed of aggregated caseo-calcareous nodules. Sometimes the only lesions present are a few projecting thin-walled cysts filled with caseo-pus in the posterior parts of the caudal lobes; in other cases the margins of the lobes are consolidated in places, and the tissue of the caudal lobes is extensively replaced by large thin-walled nodules containing caseo-pus or air cavities; in one case the whole lung was filled with large thin walled cysts, single and multilocular; the surface of these cysts is often highly vascular. A common condition of the lungs is as follows: the thin margins for a varying and unequal depth are composed of firm grey tissue containing caseous foci and streaks often in the form of delicate arborisations corresponding probably to the bronchioles; there are patches of similar tissue of varying extent and depth on the dorsal surfaces of the caudal lobes; in exceptional cases the whole dorsal surface of each lobe is covered with a continuous sheet of this tissue, (*see* Rabbit 2254, H. 129); the rest of the lung is crepitant and contains discrete caseating nodules more numerous on the surface than in the depth; in more chronic cases the solid areas are composed chiefly of caseo-calcareous substance, and may contain cavities filled with caseo-pus.

Kidneys.—The kidneys generally show lesions, but in one or two cases have not been affected; they are generally less severely affected than the lungs. They may show in the cortices only a few grey miliary tubercles some with caseous centres, or caseous tubercles seen from the surface at the bottom of a shallow depression. Almost always one sees on the surface minute pits or irregular depressed scars of a greyish or reddish grey colour; these scars frequently contain grey tubercles or nodules with caseous centres and may be very numerous and large; there may be fairly numerous nodules as well as tubercles in the cortices; they project from the surface and are sometimes caseous and softened, the projecting portion having a mulberry outline; they are however frequently grey with caseous centres. On section many are found to be continued into the medulla, sometimes extending to the apex of the papilla as caseous streaks of varying width; in some cases these streaks begin below the level of the surface of the cortex at the bottom of the pits or scars; the medulla occasionally shows caseous and softened fusiform foci and clusters of grey granulations. The pelvis of the kidney frequently contains caseo-pus; it may be small in amount and confined to one or more calyces, or considerable and cause great distention of the pelvis and apparent atrophy of the kidney substance.

The pits and scars on the surface and the pus in the pelvis of the kidneys show that renal lesions produced by human tubercle bacilli have a strong tendency to heal or undergo absorption; the long caseous streaks are formed by pus in the uriniferous tubules which is in process of being excreted.

Generally the lungs and kidneys and a gland or two are the only organs affected, but lesions may be found in any part of the body to which tubercle bacilli are carried by the blood stream.

Liver and Spleen.—These organs are rarely affected; the spleen sometimes contains a caseous or caseo-calcareous tubercle or two, and there has occasionally been a few greyish-white tubercles in the liver.

Lymphatic Glands are rarely affected; the bronchial and coeliac glands occasionally contain caseous or calcareous tubercles.

Eyes.—Tuberculosis of the eyes is fairly frequent; in early cases grey or caseous tubercles are seen in the iris; later on the lens becomes opaque and the cornea cloudy and vascularised; sometimes tuberculosis starts at the corneo-sclerotic junction, and large yellow caseous nodules form which project from the surface and may ulcerate; the eye finally may be completely disorganised and filled with caseo-pus.

Lachrymal Glands.—Lesions have been frequently found in the lachrymal glands; usually there are one or two caseous nodules only in one or both of the glands, but in a few cases they have been more numerous, and in one (No. 1256) the gland was so much enlarged that the eye was forced forwards.

Generative Organs.—In female rabbits the mammary glands are often enlarged and the alveoli distended with caseo-pus. In male rabbits the testes are sometimes greatly enlarged and caseating throughout or they contain caseating nodules of various sizes; the epididymes are often caseous or contain caseous nodules, and there are nodules on the meso-testis; in one case the spermatic cord was filled with caseo-pus.

Bones.—Areas of caseo-necrosis have been found in several of the bones, in the tibia, ilium, ribs, vertebrae, and the bones of the skull.

Joints.—Tuberculosis of the joints has only been observed in animals which have lived a considerable time after inoculation; the disease begins in the folds of the synovial membrane with the formation of caseous nodules; in a later stage all the synovial pouches in connection with the joint are distended and filled with caseo-pus and the cartilages and even the bones may be eroded.

Muscles and Areolar Tissues.—Caseous tubercles are sometimes found in the muscles and loose areolar tissues of the groin, axillae, neck and back.

Brain.—In one case a caseous nodule was found in the olfactory process near the bulb (the brain has only occasionally been examined).

Serous Surfaces.—Rarely tubercles are found on the mediastinal pleura and in the omentum or on the peritoneum.

INTRAPERITONEAL INOCULATIONS.

Thirty-two rabbits have been inoculated intraperitoneally with cultures from 14 viruses (Viruses H. 67 to H. 87): the doses inoculated were 10 milligrammes into 21 of the rabbits and 1 milligramme into 11.

Two of the former and one of the latter died from intercurrent affections and are excluded from further consideration.

Five rabbits, each inoculated with 10 mg. of culture, died in periods varying from 14 to 28 days of acute tuberculosis; the omentum was thickened, the peritoneum was covered with minute tubercles, and the condition of the organs resembled that following an intravenous inoculation. Two others died in 35 and 55 days and showed only slight general tuberculosis; another died in 92 days of general tuberculosis, the disease in the lungs being severe.

The rest of the animals, 21 in number, were killed after periods exceeding four months, the majority in good health and very fat. The lesions in the organs of these animals showed the same variation in naked eye characters and distribution as those in intravenously inoculated animals and it is unnecessary to describe them again; there were no very severely affected animals, in fact the majority were only slightly affected and the disease was in all cases retrogressive.

The omentum in animals which have lived long periods is rarely thickened and contains miliary calcareous tubercles with transparent grey margins; there are similar tubercles on the mesentery and mesocolon and on the parietal peritoneum in the lumbar regions; the tubercles on the mesentery have a characteristic arrangement, being situated in the centres of the polygonal areas formed by the branching of the mesenteric vessels.

In female rabbits the uterus and Fallopian tubes are often filled with a thin yellow pus.

SUBCUTANEOUS INOCULATIONS.

Each of the viruses has been tested on rabbits subcutaneously in the form of culture. Altogether 125 rabbits have been inoculated and 60 strains from 46 viruses have been tested.

The doses have varied from 1 to 100 milligrammes, but the majority of the animals have received 10 or more milligrammes.

The culture emulsion has in all cases been injected into the subcutaneous tissues of the back between the shoulders.

None of the rabbits inoculated subcutaneously has died of tuberculosis, a few have died from injuries and intercurrent disease but all the rest have been killed in periods varying from 94 days to 725 days, the majority having increased greatly in weight.

Post-mortem examination has revealed the following lesions. In the large proportion of cases the local lesion is a cyst the size of which varies but which is usually large; it is thin-walled and filled with caseo-pus and may be tense and spherical or flaccid and lobulated; the cyst wall is vascular and is readily separated from the surrounding tissues; occasionally the lesion is represented by a series of caseous nodules with fibrous walls or a small empty bag lined with thick granulation tissue—the latter usually communicates externally through a hole in the skin; sometimes there is an ulcer; rarely, the lesion heals completely, leaving a scar.

The glands nearest to the local lesion are situated in the angle between the triceps and the scapular muscles and are called the scapular glands. These in the majority of cases have been normal or only slightly enlarged, but in a good proportion of cases lesions have been found in them.

When tuberculous they are either slightly enlarged and contain small calcareous or caseous tubercles, or caseous and softened gritty nodules, or are much enlarged and caseous practically throughout; sometimes they are simply thin-walled cysts filled with clear fluid with no trace of gland tissue remaining or with a small patch on the wall of the cyst containing calcareous tubercles or grains.

Out of 122 rabbits inoculated subcutaneously with culture the glands were tuberculous in 54 and enlarged but not otherwise abnormal in six.

Oehlecker, in a series of 45 rabbits inoculated subcutaneously with *typus humanus* cultures grown on glycerin broth, never once found the nearest glands tuberculous or otherwise abnormal, while all rabbits inoculated with bovine tubercle bacilli showed lesions in the glands. As a result of these observations it was thought by Oehlecker that the condition of the nearest glands might be used as an aid in the differential diagnosis of a culture, the presence of glandular lesions pointing to the presence of bovine tubercle bacilli in the material inoculated. In my series there was no evidence of bovine tubercle bacilli in any of the easy-growing cultures (excluding H. 90 "I.P.") which produced tuberculosis in the nearest glands, as was clearly demonstrated in many of the cases by the isolation of Group II cultures from the distal lesions, and the experiments showed conclusively therefore that the human tubercle bacillus can cause disease and serious disease in the nearest glands. The presence of lesions in the glands therefore is not a certain indication of the presence of bovine tubercle bacilli in the material used nor does their absence prove the contrary: *e.g.*, the nearest glands were normal in a rabbit, No. 1776, which had been inoculated subcutaneously with material containing human tubercle bacilli and a small proportion of bovine tubercle bacilli.

What then is the explanation of the absence of glandular disease in one set of experiments and the presence of it in another set?

I attribute the difference in the results to the different method of experimentation. In Oehlecker's series broth cultures were inoculated and the site of inoculation was the subcutaneous tissues of the abdomen, while in my series young serum cultures were used and the site of inoculation was the subcutaneous tissues of the back; dose for dose young serum cultures are more effective than broth cultures and injection into the tissues of the back is a more severe method of inoculation than into the abdominal subcutaneous tissues.

The organs of rabbits after a subcutaneous inoculation of slightly virulent tubercle bacilli are generally only slightly affected. Sometimes they are free from tuberculous lesions. In other cases one organ only is affected, usually the lungs, occasionally the kidneys.

The lungs usually contain sparsely scattered lesions only in the form of minute grey tubercles, caseous or calcareous tubercles (sometimes aggregated together), grey nodules containing caseous foci or caseous and softened nodules gritty from calcification, the latter situated chiefly towards the posterior tips or in the thin margins of the lungs; together with the above lesions there may be irregular grey caseating patches of varying size and extent in the thin margins or on the dorsal surfaces of the caudal lobes. The kidneys are in the large majority of cases normal or show in the cortices sparsely scattered miliary tubercles; sometimes they contain in the cortices grey nodules which project from the surface and extend deeply into the substance, and in the medulla caseous streaks; rarely caseo-pus has been found in the pelvis; small pits are frequently seen on the surfaces of the kidneys and occasionally a few small scars.

Lesions are not generally found anywhere else in the body; in a few cases there have been a few miliary tubercles on the pleura.

In six out of the 125 rabbits (Nos. 1199 [H. 78], 2214 and 2215 [H. 124], 2256 and 2257 [H. 129], and 2285 [H. 143]) a more severe tuberculosis was produced than is described above. The lungs of all these animals were more severely affected than any other organ; in five instances they contained large caseating nodules which sometimes by coalescence replaced the greater part of a lobe. In the sixth (No. 2257) the lungs were even more extensively tuberculous; they were large and did not collapse and appeared from the surface to be composed throughout of tuberculous tissue; the cephalic lobes were solid and caseating almost throughout; the caudal lobes were tuberculous for a varying depth from the surface and were crepitant in the centre, the crepitant tissue containing caseating nodules. The severe disease in this case was possibly due to the immediate dissemination of a larger number of tubercle bacilli than usual, since a very similar result has occasionally been produced by the intravenous inoculation of slightly virulent cultures.

The kidneys of five of the six rabbits showed either no lesions at all or one or two miliary tubercles. The kidneys of the remaining rabbit (2256) contained scattered grey slightly caseous nodules, some projecting from the surface.

In four of the six rabbits the tuberculosis within the body was confined to the lungs and kidneys. In one (No. 2215) there were "perlsucht" growths on the pleura, and in the other (No. 2285) a number of miliary tubercles in the liver.

Whether these more severe results are to be attributed to greater susceptibility of the individual rabbits or to higher virulence of the particular cultures cannot be definitely determined. On the one hand, each culture produced in two other rabbits inoculated subcutaneously, as well as in calves, slight tuberculosis such as is often produced by the human tubercle bacillus. On the other hand, each of the two viruses (H. 124 and H. 129) produced severe tuberculosis in more than one of the rabbits inoculated subcutaneously, and a third (H. 78) produced unusually severe results by intravenous and intraperitoneal inoculation. The important points, however, in regard to the results are (1) that though the tuberculosis produced in the rabbits was severe, it was not so severe as that which follows the inoculation of bovine tubercle bacilli; (2) that death from tuberculosis* did not ensue in any of the rabbits within the period of observation (from three to five months); and (3) that the number of severely infected rabbits bears but a small proportion to the total number inoculated (6 out of 125, or 4·8 per cent).

RABBITS INOCULATED WITH TISSUE EMULSIONS.

Tabular Summaries, *pages* 174–179.

Forty-eight rabbits have been inoculated with emulsions of tuberculous human tissues and twenty-nine with sputum for the purpose of gaining an early impression as to the virulence of the bacilli in the material, and seventy with emulsions of tuberculous animal tissues, the majority as controls to the calves inoculated with the same emulsions. (*See* Modification Experiments.)

A large proportion of the animals inoculated with human tissue emulsions died of acute infections; out of a total of 48, 14 died of an acute infection or from other causes, six when killed after periods varying from 80 to 108 days showed no tuberculosis, five representing three viruses died in 32 to 77 days of severe progressive general tuberculosis identical with that set up by bovine tubercle bacilli; the remainder were killed in good health and showed slight retrogressive tuberculosis limited in the majority of cases to the site of inoculation.

Cultures from the viruses which produced no tuberculosis or slight retrogressive tuberculosis in the rabbits grew luxuriantly on artificial media and caused only slight tuberculosis in rabbits inoculated subcutaneously.

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* One died after 89 days apparently from a secondary infection of the local lesion.

The cultures from the three viruses which produced progressive tuberculosis in the rabbits inoculated with the original material were identical in every respect with bovine tubercle bacilli.

A still larger proportion of the rabbits inoculated with sputum died of acute infection, namely 14 out of 29. The intravenous, intraperitoneal and subcutaneous methods of inoculation were employed, and of the three the intravenous with small doses was found to be less likely to be followed by an acute infection.

Four of the rabbits (representing two viruses, all inoculated intravenously) that did not die within a few days of their inoculation, succumbed to severe general tuberculosis in periods varying from 32 to 49 days; the sputum used in these cases was obtained from the two viruses (H. 127 and H. 128) which yielded cultures identical with bovine cultures.

Of the remaining ten rabbits one died in 27 days and showed miliary caseous tubercles in the omentum and no disease elsewhere. Another inoculated intravenously died in 86 days of tuberculosis of the lungs, the lungs were large, heavy and composed almost throughout of firm yellow caseous substance, the only disease found elsewhere was a caseous focus or two in the bronchial glands and a caseous tubercle in each kidney. The others, eight in number, were killed in periods varying from 103 to 145 days; one showed no tuberculosis, six slight retrogressive tuberculosis, and one disseminated tuberculosis, progressive in the testicle.

In connection with the passage experiments with human tubercle bacilli a large number of rabbits have been inoculated; generally whenever an emulsion of the tuberculous lesions of calves or of guinea-pigs was inoculated into a calf, rabbits were inoculated at the same time with some of the same emulsion. All the inoculations were made with one exception into the subcutaneous tissues of the back.

The results in these rabbits were very varied. In the majority of the cases they were in agreement with those which have followed the inoculation of cultures, but in at least six such severe disease was produced, in the lungs chiefly, that it was difficult to believe that bovine tubercle bacilli were not responsible for it. The virulence of the bacilli had not, however, undergone any alteration, cultures from the final calves producing no more severe disease than the original cultures, nor were the rabbits suffering from spontaneous tuberculosis as was shown by the isolation from the lungs of several of the rabbits of cultures with the characters of the original strains.

In the majority of the rabbits apart from the six mentioned above the disease was in general more severe than in animals inoculated subcutaneously with culture. Organs such as the mammary glands, the eyes and the joints, which remained constantly normal after the subcutaneous inoculation of culture, were occasionally found to be tuberculous. In one case both eyes were disorganised and advanced in caseation. The nearest glands also were more frequently tuberculous than after culture inoculations and were often large and caseous throughout.

It is clear therefore from these experiments that bacilli in tissues are much more virulent than bacilli which have been cultivated, since the number of bacilli in the tissue emulsions could never have been so large as in the culture emulsions.

The experiments have brought out the additional important fact that human tubercle bacilli can cause, when inoculated subcutaneously into rabbits, a progressive tuberculosis which in certain organs is indistinguishable from that set up by bovine tubercle bacilli.

SUMMARY.

The cultures from the six viruses H. 69. "F.K.", H. 77. "R.L.", H. 88. "E.L.", H. 89. "W.I.", H. 127. "R.R.", and H. 128. "D.D.", with the cultural characters of bovine tubercle bacilli produced in all the rabbits inoculated fatal generalised progressive tuberculosis identical with that set up by bacilli which are the cause of bovine tuberculosis.

Intravenous inoculation of 1·0, 0·1, or 0·01 milligramme caused death within five weeks, subcutaneous inoculation of 1 to 50 milligrammes caused progressive tuberculosis fatal in periods varying from 25 to 117 days, the average for 10 milligrammes being 52 days.

The acute type of disease following intravenous inoculation or subcutaneous inoculation of large doses was very characteristic and showed little variation. Occasionally after the inoculation of small doses of bovine tubercle bacilli subcutaneously (1·0 milligramme or less) a very chronic form of tuberculosis has resulted.

A greater diversity of results has been produced by the inoculation of cultures which grow luxuriantly on artificial media.

After the intravenous inoculation of 1·0 milligramme or 0·1 milligramme rabbits have died of acute tuberculosis which it was in some cases difficult to distinguish from cases of bovine infection. Occasionally rabbits have died after longer periods, 2 to 3 or more months, of a more chronic tuberculosis; in none of these cases did the disease display in the principal organs affected, the lungs and kidneys, the features (massive tuberculous pneumonia in the former and nail-shaped firm projecting nodules in the latter) which are so characteristic of an infection with bovine tubercle bacilli. Animals which live a long time after intravenous inoculation of human tubercle bacilli may show lesions in any part of the body to which tubercle bacilli are carried by the blood stream, in the joints, bones, eyes, brain, testes, mammary glands, muscles, and areolar tissues; these lesions are of a slowly progressive nature and have in several cases caused the death of the animal.

Other rabbits inoculated intravenously have remained well, increased in weight and showed when killed after more than four months slight retrogressive tuberculosis only.

No death from tuberculosis has resulted within the period of observation (3 to 5 months) from the intravenous inoculation of 0·01 milligramme of these Group II cultures, or from the subcutaneous inoculation of 10 milligrammes or more though severe disease has occasionally been produced which would eventually have proved fatal.

Since therefore chronic tuberculosis may follow the subcutaneous inoculation of a dose of 1·0 milligramme or less of bovine tubercle bacilli, and fatal tuberculosis may be caused by the intravenous inoculation of 1·0 or 0·1 milligramme of human tubercle bacilli, it is necessary in order to bring out most clearly the differences in virulence which exist between bovine and human tubercle bacilli to inoculate subcutaneously a larger dose than 1·0 milligramme and intravenously a smaller dose than 0·1 milligramme. My experiments have shown that 10 milligrammes or more for the subcutaneous inoculations and 0·01 milligramme for the intravenous are suitable doses to employ.

Some observers consider that the condition of the nearest glands supplies a valuable additional means of differentiating between human and bovine tubercle bacilli when glycerin broth cultures are used, the glands after the former being normal, after the latter large and caseous. In my experiments in which serum cultures only have been used the nearest glands after the subcutaneous inoculation of cultures of bovine tubercle bacilli have always been caseous; after the inoculation of human tubercle bacilli in a large proportion of cases the glands have been normal but there is no inconsiderable number in which the nearest glands have presented some degree of tuberculosis usually slight but occasionally extensive. Moreover in one case in which material containing a small number of bovine tubercle bacilli was inoculated the nearest glands were normal.

The presence or absence therefore of lesions in the nearest glands after subcutaneous inoculation does not necessarily point to the presence or absence of bovine tubercle bacilli in the material inoculated.

TABLE SHOWING COMPARATIVELY THE DURATION OF LIFE OF RABBITS INOCULATED WITH VIRULENT TUBERCLE BACILLI OF HUMAN AND ANIMAL ORIGIN.

Virulent Tubercle Bacilli of Human Origin.

Method of Inoculation.	Dose.	Total Number of Rabbits Inoculated.	Limits of Variation in Duration of Life.	Average Duration of Life.
Intravenous	1·0 mg.	5	10–20 days	15·4 days.
,, ...	0·1 mg.	8	15–25 days	20·1 days.
,, ...	0·01 mg.	2	24–30 days	27·0 days.
Intraperitoneal	1·0 mg.	4	14–19 days	19·2 days.
,, ...	0·1 mg.	5	22–49 days	27·2 days.
Subcutaneous	50·0 mg.	3	31–50 days	39·7 days.
,, ...	10·0 mg.	29	25–87 days	52·07 days.
,, ...	1·0 mg.	6	41–117 days	78·3 days.

Virulent Tubercle Bacilli of Animal Origin (Bovine and Porcine).

Method of Inoculation.	Dose.	Total Number of Rabbits Inoculated.	Limits of Variation in Duration of Life.	Average Duration of Life.
Intravenous	1·0 mg.	42	9–21 days	14·7 days.
,, ...	0·1 mg.	99	11–34 days	19·6 days.
Intraperitoneal	1·0 mg.	91	10–38 days	17·8 days.
,, ...	0·1 mg.	74	13–48 days	25·5 days.
Subcutaneous	10·0 mg.	18	28–101 days	53·7 days.
,, ...	1·0 mg.	100	29–165 days	71·4 days.

INOCULATION EXPERIMENTS ON GUINEA-PIGS.

INTRODUCTION.

Guinea-pigs are very susceptible to tuberculosis; an extremely small number either of human or bovine tubercle bacilli is able, when introduced into their tissues, to set up in them general progressive tuberculosis. On account of this high susceptibility the guinea-pig has been largely used to detect the presence of tubercle bacilli in fluids and tissues, or to verify the nature of doubtful lesions when tubercle bacilli are too few to be demonstrated with certainty in any other way.

The guinea-pig has also proved very useful for increasing the numbers of tubercle bacilli when passing a human virus through the bodies of calves, and in the production of cultures. All human tuberculous material obtained from the cadaver is liable to contain other organisms, and on this account it is often impossible to obtain pure cultures of the tubercle bacillus direct; also the original material may contain very few tubercle bacilli, and the attempts to obtain cultures may fail on this account. In the one case the guinea-pig furnishes a tuberculous material free from contaminating organisms, and in the other a material rich in tubercle bacilli.

The guinea-pigs inoculated with tissue emulsions have received very varying doses of tubercle bacilli, and, moreover, the great majority of the animals have not been allowed to live a longer time than was necessary for the development of early tuberculosis; hence experiments with tissue emulsions are valueless as tests of comparative virulence.

With regard to these experiments it is sufficient to say that the anatomical changes produced were identical with those produced in animals inoculated with culture which lived an equal length of time. The picture of the disease produced varies with the mode of inoculation and the duration of life, the duration of life being determined by the dose and virulence of the bacilli inoculated and the susceptibility of the individual guinea-pig. Intraperitoneal inoculation of large to moderate doses produces a more rapidly fatal disease than equivalent doses inoculated subcutaneously; when very small doses are inoculated intraperitoneally, guinea-pigs often live as long or longer than those inoculated subcutaneously with equivalent doses.

In order to test the comparative virulence of the viruses for the guinea-pig, estimated doses of culture from each have been inoculated. Sixty-one strains from 52 viruses have been inoculated into 170 guinea-pigs, and from two to four guinea-pigs (in one case ten) have been inoculated with each strain. The dose in the majority of cases was 0·1 milligramme, in the others 1·0 milligramme; the methods used were the intraperitoneal and the subcutaneous.

With the exception of six which died prematurely all the guinea-pigs died of general tuberculosis in periods varying from 10 to 244 days.

Ten of the strains inoculated were identical in cultural characters and virulence for the rabbit with the bovine tubercle bacillus; the others corresponded in their characters to the human tubercle bacillus.

A comparison of the effects produced by the two types of bacilli shows that the bovine tubercle bacillus is as a general rule more virulent for the guinea-pig than the human tubercle bacillus. Guinea-pigs inoculated with bovine tubercle bacilli live on an average a shorter time than guinea-pigs inoculated with human tubercle bacilli (*see* table on page 42), and generally exhibit a more acute type of disease.

These differences, however, are not sufficiently constant to furnish a means of differentiating always between bacilli of high and low bovine virulence. The disease set up by bovine tubercle bacilli is not always of an acute type, and human tubercle bacilli sometimes cause a tuberculosis which is indistinguishable from that produced by bovine tubercle bacilli. I give below a general description of the lesions produced by the bovine and human types of tubercle bacilli respectively.

GUINEA-PIGS INOCULATED WITH CULTURES OF BOVINE TUBERCLE BACILLI.

Tabular Summary, page 224.

INTRAPERITONEAL INOCULATIONS.

Thirteen guinea-pigs have been inoculated intraperitoneally with cultures from six viruses, three with 1·0 milligramme and ten with 0·1 milligramme.

The guinea-pigs inoculated with 1·0 mg. died in periods varying from 10 to 19 days (average 15 days), those inoculated with 0·1 mg. died in periods varying from 12 to 23 days (average 17·1 days).

The post-mortem appearances vary with the duration of life of the animals. In guinea-pigs which die within 14 days the disease presents the following features.

The omentum is thickened, contracted and composed of firm caseating tissue; it is adherent to many of the surrounding structures, chiefly to the posterior surface of the liver and to the small intestines and occasionally to the floor of the abdomen and the stomach as well. The parietal peritoneum is congested and covered with a fibrinous membrane, speckled with grey points, which readily peels off. The mesentery is contracted thickened and covered with a membrane similar to that on the peritoneum, the peritoneal cavity contains a slight excess of fluid and strands of fibrin stretch between the parietal and visceral peritoneum.

The spleen is usually slightly enlarged and generally glued to the wall of the abdomen; the Malpighian bodies are enlarged and minute grey points may be seen in the pulp through the capsule. The liver is beset with irregular grey and yellowish foci; in the kidneys and suprarenal bodies no tubercles are visible.

The pleural cavities are filled with clear serous fluid and the lungs are collapsed and often almost completely consolidated; in the dark red hepatised parts minute grey points are seen under the pleura. The pyloric, lumbar and sternal glands are always more severely affected than other lymphatic glands and are enlarged and usually caseous throughout; the portal and other abdominal lymphatic glands are also slightly enlarged and show varying amounts of caseation in the cortices; the bronchial glands are slightly enlarged, congested and may or may not contain minute caseous foci.

Similar appearances may be presented by guinea-pigs which die within three weeks but more usually the type of disease for such animals is as described below. The following is a description of the lesions in animals which live for periods up to three weeks or a month.

There is an eruption of minute tubercles on the peritoneum mesentery and meso-colon, often so numerous as in places to form a continuous layer; occasionally the peritoneum shows patches of thickening to which various structures may be adherent, and in the mesentery the tissues around the vessels may be thickened and caseating. The omentum is larger and more advanced in caseation, and is usually not so universally adherent to the surrounding structures as in the more acute cases.

The spleen is moderately enlarged and shows in the pulp grey tubercles which may have caseous centres and small caseo-necrotic patches in the thin margins. The liver is paler than normal and mottled with irregular yellowish necrotic foci of various sizes.

The conditions in the thorax are generally the same as above described with the exception that the tubercles in the lungs are larger; sometimes the lungs are crepitant and the pleural cavities do not contain fluid. The pleura is often covered with an eruption of small tubercles. Caseation in the lymphatic glands is more advanced and in most of the peripheral glands caseous tubercles are visible.

No guinea-pigs inoculated intraperitoneally with the bovine cultures have lived longer than 28 days.

SUBCUTANEOUS INOCULATIONS.

Eleven guinea-pigs have been inoculated subcutaneously with cultures from six viruses, three with 1·0 milligramme and eight with 0·1 milligramme.

The guinea-pigs inoculated with 1·0 mg. died in periods varying from 45 to 71 days (average 57·7), those inoculated with 0·1 mg. died in from 33 to 59 days (average 50·1)

In animals inoculated subcutaneously the swelling which develops at the seat of inoculation (in these experiments the subcutaneous tissues of the abdominal wall) soon breaks down and a caseous ulcer forms; glands in the groin become enlarged and can be felt as smooth freely moveable tumours.

The following is a description of the lesions found in guinea-pigs which have died in from 6 to 8 weeks after subcutaneous inoculation of culture.

There is invariably an ulcer at the seat of inoculation, this may be shallow and show no caseation except under the margins or may have a thick caseous base the floor of which is covered by a dry caseous scab.

The inguinal, iliac and sternal glands are enlarged and caseous and softened practically throughout, the axillary, portal and bronchial glands are enlarged and generally only partly caseous; other glands of the body are usually affected containing caseous nodules of various sizes.

The spleen is enlarged and shows its substance closely packed with coalescing caseating tubercles or is extensively composed chiefly around the margins and on the convex surface of firm yellowish white necrosed tissue; the organ is rarely adherent. The liver usually shows some degree of enlargement and the surface is often irregular; the tissue is paler and firmer than normal and mottled or marbled with patches of necrosis, usually canary yellow but often olive or dark green.

The lungs are usually crepitant but may show patches of consolidation in the anterior lobes; they contain a varying generally moderately large number of discrete caseous tubercles with grey margins ranging from 0·5 to 2 mm. in diameter. Sometimes the lungs are consolidated and the pleural cavities filled with fluid. The kidneys suffer less than the liver, spleen, or lungs; they are often free from visible lesions and when affected contain only one or two tubercles.

Tubercles are occasionally seen on the pleura, in the heart and suprarenal bodies, and the lymphoid follicles in the caecum are frequently caseous.

GUINEA-PIGS INOCULATED WITH CULTURES OF HUMAN TUBERCLE BACILLI.

Tabular Summary, pages 225–233.

INTRAPERITONEAL INOCULATIONS.

Sixty-eight guinea-pigs have been inoculated intraperitoneally with culture from forty-five viruses, twenty receiving 1·0 milligramme, forty-four 0·1 milligramme, two 0·01 milligramme, and two 0·00001 milligramme.

The guinea-pigs inoculated with 1·0 milligramme died of general tuberculosis in periods varying from 13 to 47 days (average 22·5); one which died after 95 days of slight general tuberculosis and pseudo-tuberculosis is not included. Those inoculated with 0·1 mg. with one exception died of general tuberculosis in periods varying from 14 to 65 days (average 27·9); the exceptional animal died of general tuberculosis in 161 days. The two inoculated with 0·01 mg. died in 20 and 43 days, and the two inoculated with 0·00001 mg. in 169 and 320 days.

The examination of the tabular summary on page 225 shows that out of the total number of animals which died of uncomplicated general tuberculosis after the intraperitoneal inoculation of 0·001 to 1·0 milligramme only 3 died within 14 days, 22 died within 21 days, and 14 within 28 days; the rest, 22 in number, lived longer than a month, the longest period being 65 days.

The disease in one of the three guinea-pigs (No. 3012), which died within 14 days, closely resembled that produced by bovine tubercle bacilli (Group I) but there was not such severe reaction of the peritoneum, the omentum was not adherent to any of the surrounding structures, and there were no fibrous strands in the peritoneal cavity and no congestion of the peritoneum. In the other two guinea-pigs the disease was much less severe in the peritoneum and in the organs; in these cases there was no fluid in the pleural cavities and the lungs were crepitant and contained only one or two minute tubercles.

In the majority of the guinea-pigs which died in periods varying from 14 to 28 days the pathological changes were practically identical with those produced in the same periods by Group I bacilli. There has been no single feature or group of features consistently met with in animals inoculated with Group I bacilli which have not also been met in animals inoculated with human tubercle bacilli (Group II). The kidneys of the guinea-pigs inoculated with Group II cultures have shown lesions rather more frequently than the Group I guinea-pigs; these lesions were in the form of submiliary tubercles situated usually in the medulla along its outer margin.

In most of the above animals the pleural cavities were filled with fluid and the lungs were collapsed and consolidated.

With longer duration of life the character of the disease approximates more and more to that in guinea-pigs which have been inoculated subcutaneously and have died after an equal interval of time; the longer the animal has lived the less is the amount of omental and peritoneal tuberculosis; the parietal peritoneum may even not be affected, as was the case in Guinea-pig 2323 (lived 65 days).

SUBCUTANEOUS INOCULATIONS.

Seventy-nine guinea-pigs have been inoculated subcutaneously with cultures from 46 viruses, 32 with 1·0 milligramme, 45 with 0·1 milligramme, and 2 with 0·00001 milligramme.

Four of the guinea-pigs died within a few days of their inoculation, in another the inoculation was partly intraperitoneal, and in two others the tuberculosis was considered insufficient to account for death.

The rest of the guinea-pigs died of uncomplicated general tuberculosis, those inoculated with 1·0 milligramme in 39 to 244 days (average 80·9), those inoculated with 0·1 milligramme in 33 to 137 days (average 65), and those inoculated with 0·00001 milligramme in 184 and 188 days (average 186).

Only ten of the animals lived more than 100 days.

These averages exhibited in the table on page 42 show that the human tubercle bacillus is not as a general rule so rapidly fatal for guinea-pigs as the bovine tubercle bacillus. There are however many animals inoculated with human tubercle bacilli whose duration of life is within the limits of time taken by bovine tubercle bacilli to kill. Does a post-mortem examination in these cases reveal any marked difference in the processes set up by the two types of bacilli?

A comparison of the lesions in animals which have lived an equal length of time shows that while in some the disease produced by the one type of bacillus is practically identical with that produced by the other, in the majority of cases slight differences are observed.

The most constant of these is the less severe implication of lymphatic glands by the human tubercle bacillus; in guinea-pigs which have lived eight weeks after the inoculation of bovine tubercle bacilli all the glands in the body are enlarged and caseous, some wholly others partly; in guinea-pigs which have survived the same period after human tubercle bacilli the nearest glands, inguinal and sternal, are usually the only glands which are caseous throughout (sometimes these are only partly caseous) the others showing caseous patches or discrete caseous foci, and only a moderate degree of enlargement; occasionally some glands are normal which is not often the case after bovine tubercle bacilli.

The spleen in an animal which has survived about eight weeks after the inoculation of bovine tubercle bacilli is invariably extensively caseo-necrotic; human tubercle bacilli often produce the same kind of diffuse caseo-necrotic change but in a good many instances the spleen has been found to contain discrete tubercles only, either quite grey or with caseous centres. In these cases the liver also is not so severely affected, the necrotic patches being smaller than usual and many grey foci being seen.

In the lungs the tubercles though not less numerous are more often translucent and grey or less advanced in caseation in guinea-pigs inoculated with human tubercle bacilli than in guinea-pigs inoculated with bovine tubercle bacilli. The kidneys only occasionally show tubercles; they do not appear to be more susceptible to the human than to the bovine tubercle bacillus.

In the guinea-pigs which lived more than 100 days the lymphatic glands, apart from those adjacent to the local lesion, were generally very fibroid and not much enlarged, they showed calcareous grains or fibro-caseous patches or small cavities filled with pus; lymphatic glands in guinea-pigs which lived the same length of time after bovine tubercle bacilli were usually very large and caseous and softened throughout.

The lungs, especially the cephalic lobes, were composed largely of dense greyish fibroid tissue formed by aggregated nodules, occasionally small cavities were found but there was usually little or no caseation. The liver was enlarged dense and fibroid, the whole of a lobe being sometimes of a greyish-white colour and showed only a few necrotic patches which were in some cases softened and spherical. The spleen was large red and speckled with grey foci, or mottled with necrotic patches in which gritty foci were detected. Occasionally tubercles were found in the kidneys.

The disease in these organs has, however, exhibited no feature which has not also been observed in the organs of guinea-pigs which have survived for the same length of time after the inoculation of bovine tubercle bacilli.

In a few cases the immediate cause of death was haemorrhage into the peritoneal cavity from a ruptured vessel in the spleen or liver; this usually occurred in animals which had lived some length of time.

SUMMARY.

All the cultures, whether possessed of high or low virulence for the calf and rabbit, produced in doses of 1·0 milligramme or 0·1 milligramme fatal general progressive tuberculosis in every guinea-pig inoculated. The same result was produced, but not so quickly, with even smaller doses, with 0·0001 milligramme of culture and with small quantities of emulsions or milk in which tubercle bacilli were not demonstrated microscopically.

The guinea-pigs inoculated with bovine tubercle bacilli succumbed to tuberculosis, as a general rule, more quickly than guinea-pigs inoculated with human tubercle bacilli, the difference in the average duration of life being more marked after subcutaneous than after intraperitoneal inoculation.

The disease produced, however, by the human tubercle bacillus was, in its broad anatomical features, very similar to that caused by the bovine tubercle bacillus and was in some cases identical. But usually there were slight differences in the respective diseases which indicated that the human tubercle bacillus was not so virulent for the guinea-pig as the bovine tubercle bacillus.

In guinea-pigs infected with human tubercle bacilli the lymphatic glands did not generally become so large or so caseous as the glands of guinea-pigs infected with bovine tubercle bacilli and there was often less necrosis of the spleen and sometimes of the liver and less rapid and complete caseation of the tubercles in the lungs in the former than in the latter animals. These differences however are not constant, and cannot therefore be used as a means of differentiating bovine from human tubercle bacilli.

The distribution of the disease in guinea-pigs which have not died acutely differs in important respects from that in chronically but fatally infected rabbits. The liver and spleen of such guinea-pigs are always tuberculous and often extensively necrosed, the lungs contain discrete tubercles in varying number, but the kidneys rarely show lesions. The liver and spleen of the rabbits, on the other hand, are frequently normal, while the lungs and kidneys are always severely affected, the lungs more than the kidneys. In chronically infected rabbits, lymphatic glands, apart from those near the local lesion, are usually normal while in guinea-pigs they are usually tuberculous.

TABLE SHOWING THE COMPARATIVE VIRULENCE FOR GUINEA-PIGS OF TUBERCLE BACILLI OF HUMAN AND ANIMAL ORIGIN.

INTRAPERITONEAL INOCULATIONS.

—	Dose.	Number of Animals.	Limits of Variation in Duration of Life.	Average Duration of Life.
Slightly Virulent Tubercle Bacilli of Human Origin :	1·0 mg.	17	13–47 days	22·5 days.
	0·1 mg.	40	14–65 days	27·9 days.
Virulent Tubercle Bacilli of Human Origin :	1·0 mg.	3	10–19 days	15·0 days.
	0·1 mg.	10	12–23 days	17·1 days.
Virulent Tubercle Bacilli of Animal Origin :	1·0 mg.	12	9–16 days	11·1 days.
	0·1 mg.	48	10–27 days	16–2 days.

SUBCUTANEOUS INOCULATIONS.

—	Dose.	Number of Animals.	Limits of Variation in Duration of Life.	Average Duration of Life.
Slightly Virulent Tubercle Bacilli of Human Origin :	1·0 mg.	30	39–244 days	80·9 days.
	0·1 mg.	40	33–137 days	65·0 days.
Virulent Tubercle Bacilli of Human Origin :	1·0 mg.	3	45–71 days	57·7 days.
	0·1 mg.	8	33–59 days	50·1 days.
Virulent Tubercle Bacilli of Animal Origin :	1·0 mg.	12	29–76 days	47·6 days.
	0·1 mg.	50	26–83 days	44·9 days.

TABLE SHOWING COMPARATIVELY THE DURATION OF LIFE OF GUINEA-PIGS INOCULATED—

(*a*) With a culture of bovine tubercle bacilli.	(*b*) With a culture of human tubercle bacilli.
43 days	46 days
48 „	49 „
50 „	61 „
50 „	70 „
52 „	71 „
55 „	90 „
61 „	102 „
67 „	103 „
69 „	122 „
70 „	151 „
Average duration of life—56·5 days.	Average duration of life—86·5 days.

The appended Table shows clearly the difference in virulence between a culture of bovine and a culture of human tubercle bacilli, and the range of variation in the susceptibility of guinea-pigs to tuberculosis. Two series each of ten guinea-pigs were inoculated, one with bovine tubercle bacilli (Calf 1537, H. 108. " H.R."), the other with human tubercle bacilli (O.M., H. 147. " P.C.") ; the guinea-pigs were inoculated subcutaneously, and each received 1 milligramme of culture.

The guinea-pigs inoculated with bovine tubercle bacilli died of tuberculosis in periods ranging from 43 to 70 days (average 56·5 days), while those inoculated with human tubercle bacilli died in periods varying from 46 to 151 days (average 86·5).

The variation in the duration of life and the naked-eye characters of the disease produced were much greater among the guinea-pigs inoculated with human tubercle bacilli than among those inoculated with bovine tubercle bacilli, and all the former exhibited the less severe type of disease which usually follows the inoculation of the human tubercle bacillus.

INOCULATION EXPERIMENTS ON RHESUS MONKEYS.

Tabular Summary, page 236.

One of the strains of tubercle bacilli with the cultural characters and virulence for the calf and rabbit of the bovine tubercle bacillus (H. 127), and six strains with the properties of the human tubercle bacillus, have been tested on monkeys subcutaneously.

Two monkeys were inoculated with the bovine type of culture, the dose in each case being 1 milligramme, and 14 with the human type the doses varying from 0·00001 milligramme to 10 milligrammes.

The two monkeys inoculated with the bovine culture died in 27 and 43 days of general tuberculosis. Two of the 14 inoculated with human tubercle bacilli died prematurely; the others died in periods varying from 30 to 54 days and showed general tuberculosis.

The disease produced by the human tubercle bacilli was equal in severity to that produced by the bovine tubercle bacilli of human origin, and no difference was observed either in the naked-eye characters of the disease or in the distribution of the lesions.

The results obtained with the human tubercle bacillus are identical also with those obtained with cultures raised directly from bovine tuberculous lesions (*see* Volume I of Appendix to the 2nd Interim Report); six monkeys inoculated subcutaneously with doses varying from 0·001 milligramme to 10 milligrammes succumbed to generalized tuberculosis in periods varying from 33 to 56 days.

The experiments show therefore that the human tubercle bacillus is as virulent for the rhesus monkey as the bovine tubercle bacillus.

The inoculation of very small doses has demonstrated how very susceptible the rhesus monkey is to infection with either type of bacillus; a monkey inoculated subcutaneously with 0·001 milligramme of a bovine culture died in 45 days of generalised progressive tuberculosis, and three monkeys, two inoculated with 0·001 milligramme and one with 0·00001 milligramme of human tubercle bacilli died of general tuberculosis in 48, 54, and 49 days respectively.

The duration of life of these animals was only slightly longer than the average life of animals inoculated with a thousand and a hundred thousand times the quantity of bacilli, and the disease produced was as severe as that produced by larger doses, the only difference being the greater size of some of the lesions due to the longer duration of life. Tubercle bacilli apparently multiply very rapidly in the tissues of the monkey, and a small dose quickly becomes equivalent to a large one.

Summary of Effects produced.

The following is a brief description of the effects produced in monkeys by the subcutaneous inoculation of cultures of human or bovine tubercle bacilli. In every case the culture was inoculated into the subcutaneous tissues of the back between the shoulders or over one of the scapulae.

The swelling which develops soon softens, and the skin over the centre becomes red thin and finally breaks down, caseo-purulent substance exuding; necrosis and ulceration of the skin continues, often extending almost to the margins of the tumour; in such cases the floor of the ulcer is formed by the muscles of the back, which may or may not contain caseous nodules. The glands in the axillæ enlarge, and can be readily seen and felt during life.

The animal very soon after inoculation, in the second or third week, shows sign of illness; the coat stares, the disposition is less lively, the appetite diminishes, and there is generally rapid emaciation; the animal becomes progressively worse and finally dies in a state of collapse; during the first days of illness the temperature rises and remains high until towards the end when it falls, and the animal perhaps for two or three days before death has no temperature that can be recorded on a clinical thermometer; there is rarely any noticeable increase in the rate of respiration.

At the post-mortem examination of animals which die within five or six weeks the following lesions are found:

The local lesion is usually an ulcer with caseous margins and floor formed by muscles covered with dried caseo-pus or a layer of fibrino-pus. The nearest glands—the axillary, some of the vertebral and the cervical glands in the posterior triangle—are enlarged, caseous, and softened throughout. The lungs are voluminous but crepitant, and contain a varying usually a rather small number of shotty miliary caseating tubercles; the bronchial glands are slightly enlarged and contain caseous tubercles and nodules, the intertracheo-bronchial being generally more severely affected than the praetracheo-bronchial.

The spleen is much enlarged and shows on its surface many projecting nodules; on section its pulp is found to be extensively replaced by caseous and softened nodules, varying up to 3 millimetres in diameter.

The liver is enlarged pale and closely beset with caseous tubercles varying from a mere point up to 1·5 or 2 millimetres in diameter. The portal glands, which in this animal are closely associated with the head of the pancreas, are enlarged and their cortices replaced by caseous nodules.

The kidneys show in the cortices on the surface as well as in the depth a varying number of caseous tubercles, occasionally tubercles are found in the medulla as well. The omentum is covered with tubercles, the majority small grey and translucent, the larger ones yellow and caseous; caseous tubercles are seen also on the mesentery and meso-colon.

All the lymphatic glands of the body other than those mentioned above contain scattered miliary caseous tubercles. Occasionally tubercles are found on the dura mater between it and the bone, in the walls of the intestines and heart, in the muscles, and in the submaxillary salivary glands.

Smear preparations from the lesions show tubercle bacilli in large numbers.

In animals which live a longer time, up to eight weeks, the distribution of the disease is very similar, but the lesions in the organs and glands are often larger and in the lungs are usually more numerous.

TABULAR SUMMARY OF INOCULATION EXPERIMENTS ON RHESUS MONKEYS WITH CULTURES OF BOVINE AND HUMAN TUBERCLE BACILLI.

All the monkeys died of general tuberculosis.

Dose in Milligrammes.	Number of Monkeys.	Duration of Life.	Number of Monkeys.	Duration of Life.
	(*a*) Cultures of Bovine T.B.		(*b*) Cultures of Human T.B.	
10·0 mg.	One	Died in 35 days.	One	Died in 30 days.
1·0 mg.	Five	Died in 27 to 45 days.	Six	Died in 25 to 45 days.
0·1 mg.	Two	Died in 26 and 56 days.	One	Died in 54 days.
0·01 mg.	Two	Died in 36 and 53 days.	One	Died in 32 days.
0·001 mg.	One	Died in 45 days.	Two	Died in 48 and 54 days.
0·00001 mg.	—	—	One	Died in 49 days.

INOCULATION EXPERIMENTS ON CHIMPANZEES.

One chimpanzee (No. 7) has been inoculated subcutaneously with human tubercle bacilli; it received 0·00001 milligramme of culture derived from the tuberculous lung of a man (Virus H. 81. "P.W."), and died 92 days later. The post-mortem examination revealed general tuberculosis of moderate severity; the local lesion was softened and caseous, the adjacent glands were enlarged and caseous, the spleen and liver contained moderately numerous caseous nodules, there were scattered caseous nodules in the lungs and three in the kidneys, and the thoracic and most of the abdominal lymphatic glands were tuberculous to some extent. A rhesus monkey inoculated with an equivalent dose of the culture died of general tuberculosis in 49 days.

Dr. Cobbett inoculated a chimpanzee (No. 1) subcutaneously with 1 milligramme of a human (Group II) culture. The animal died in 50 days of general tuberculosis. (*See* Appendix to 2nd Interim Report, Vol. II, page 1170.)

These two experiments show that the chimpanzee is very susceptible to the human tubercle bacillus.

One additional experiment has been made on the chimpanzee with bovine tubercle bacilli since the publication of the 2nd Interim Report. A chimpanzee (No. 24) was inoculated subcutaneously with 0·00001 milligramme of culture from Virus B. IV, and died 107 days afterwards of severe general tuberculosis (the culture used in this experiment had been passed through a series of four chimpanzees, and was unchanged in cultural characters and virulence for the monkey).

This is the third inoculation experiment which has been made on the chimpanzee with bovine tubercle bacilli. The other two are published in the Appendix to the 2nd Interim Report (Vol. I, page 186, Vol. III, page 114). One of these chimpanzees received 1 milligramme subcutaneously, and died of general tuberculosis in 55 days; the other received 0·001 milligramme, and died of general tuberculosis in 87 days.

The chimpanzee, like the rhesus monkey, is therefore very susceptible both to the human and to the bovine tubercle bacillus, an extremely small dose of either kind of bacillus being capable of producing rapidly fatal general tuberculosis. The experiments do not bring out any difference in the virulence for the chimpanzee of the two kinds of tubercle bacilli.

TABULAR SUMMARY OF INOCULATION EXPERIMENTS ON CHIMPANZEES.

Virus.	Number of Chimpanzee.	Dose.	Duration of Life.	Result.
		Bovine Cultures.		
B. IV. (Original material)	4	1·0 mg.	Died 55 days	General tuberculosis.
„ (Chimpanzee 16)...	22	0·001 mg.	Died 87 days	General tuberculosis.
„ (Chimpanzee 22)...	24	0·00001 mg.	Died 107 days	Severe general tuberculosis.
		Human Cultures.		
H. 25. "A.T."	1	1·0 mg.	Died 50 days	General tuberculosis.
H. 81. "P.W."	7	0·00001 mg.	Died 92 days	General tuberculosis.

INOCULATION EXPERIMENTS ON PIGS.

Tabular Summary, page 240.

Four pigs have been inoculated subcutaneously with culture from the two slightly-virulent viruses H 87. "W.D." and H. 93. "C.D."; the doses were 40, 50 (in two cases), and 100 milligrammes.

All the pigs were killed in good health in periods varying from 100 to 253 days; they had increased greatly in weight and had not shown any sign of illness during the experiment.

In one of the pigs the disease was confined to the seat of inoculation and the nearest glands; in each of the other three besides a local lesion and caseation of the nearest glands there were a few calcareous tubercles in the lungs and no signs of tuberculosis elsewhere.

These experiments show that the human tubercle bacillus is not able to set up progressive tuberculosis in pigs. Other experiments performed by Cobbett[*] with this type of bacillus gave similar results; four pigs were inoculated subcutaneously each with 50 milligrammes and one with 1 milligramme; they were killed in good health after 2 to 3 months and each showed slight retrogressive tuberculosis.

The pig, like the calf and goat therefore is very resistant to the human tubercle bacillus; it appears however to be slightly more susceptible than the calf since disseminated lesions were more numerous and more frequently present.

None of the virulent cultures recently isolated from human lungs has been tested on pigs.

The experiments published in the 2nd Interim Report show however that severe general tuberculosis is very readily set up in pigs by the subcutaneous inoculation of bovine tubercle bacilli whether of human or animal origin.

INOCULATION EXPERIMENTS ON GOATS.

Tabular Summary, page 241.

Four goats have been inoculated with cultures of human tubercle bacilli, three subcutaneously and one intravenously.

One of the goats inoculated subcutaneously received 100 milligrammes of Virus H. 79. "J.N.", and was killed in good health 106 days later; it showed slight generalized retrogressive tuberculosis; another received 10 milligrammes of Virus H. 98. "B.R." and showed when killed after 114 days a local lesion and miliary tubercles in the mamma with no disease elsewhere; the third received 25 milligrammes of Virus H. 118. "F.C." and when killed after 116 days had local tuberculosis and slight tuberculosis of the lungs only.

The goat inoculated intravenously received 2 milligrammes of Virus H. 115. "N.G.", and died in 41 days of tuberculous pneumonia; the lungs were partly solid and reddish-grey and partly air-containing and beset with transparent grey tubercles; the thoracic glands were much enlarged, reddish in colour, and showed on section translucent grey areas without caseation or calcification; there was no sign of disease anywhere else in the body.

The human tubercle bacillus is incapable therefore of setting up progressive tuberculosis in the goat.

No inoculations have recently been made into goats with cultures possessed of high virulence for the calf. The experiments however published in the

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[*] *See* Appendix to 2nd Interim Report, Vol II, page 1158.

2nd Interim Report show quite conclusively that bovine tubercle bacilli, whether of human or animal origin, are highly virulent for the goat and capable of setting up in them generalised progressive tuberculosis.

The goat therefore reacts to human and bovine tubercle bacilli in the same manner as the calf.

The difference in virulence for the goat of the two kinds of bacilli is well shown by two of the experiments; 100 milligrammes of human tubercle bacilli inoculated subcutaneously into a goat (No. 59) produced in 106 days only slight retrogressive tuberculosis, while 0·01 milligramme of bovine tubercle bacilli caused in 91 days severe generalised progressive tuberculosis.

INOCULATION EXPERIMENT ON A HORSE. (*See page* 242.)

Only one horse (a pony 18 years old) has been inoculated with a culture of the human tubercle bacillus. The culture was obtained from a tuberculous human lung (Virus H. 81. "P.W.") and 50 milligrammes were inoculated into the subcutaneous tissues of the neck.

The horse was killed in good health 116 days after inoculation, not having shown any sign of ill-health during the experiment.

A post-mortem examination revealed a series of small softened caseous nodules at the site of inoculation, a pea-sized caseous nodule in the prescapular gland, and no sign of disease elsewhere.

A culture isolated from the prescapular gland through the guinea-pig resembled the culture inoculated.

INOCULATION EXPERIMENTS ON DOGS.

Tabular Summaries, pages 244–246.

With Tissue Emulsions.

Five dogs, all puppies, have been inoculated intraperitoneally with emulsions of tuberculous tissues; the emulsions used were made in one case from a human lung, in another from the prescapular gland of a calf, and in a third from the organs of guinea-pigs; in each case the tubercle bacilli in the emulsions were shown to be slightly virulent for the calf and rabbit.

Human tubercle bacilli when inoculated intraperitoneally in large doses had been shown to multiply abundantly in the tissues of dogs, and these puppies were inoculated for the purpose of obtaining emulsions rich in the bacilli which were being passed through the bodies of calves.

Two of the puppies, Nos. 39 and 41, inoculated with the emulsion of guinea-pigs' tissues, were killed in 35 and 36 days when apparently well; both showed early general tuberculosis, severe in one but not severe in the other; an emulsion of the tuberculous tissues of each of these animals was made and inoculated into a calf; smear preparations showed numerous tubercle bacilli in the emulsions.

The other three remained well and when killed in periods varying from 111 to 165 days showed slight generalised retrogressive tuberculosis.

With Cultures.

Six dogs have been inoculated with cultures of the human tubercle bacillus, one subcutaneously, four intraperitoneally, and one intravenously, the doses varying from 1 to 50 milligrammes.

The animal, No. 25, a puppy, inoculated subcutaneously, received 10 milligrammes and was killed 143 days later; it showed two small scars in the skin of the abdomen at the site of the inoculation and no sign of disease elsewhere.

Two of the four dogs inoculated intraperitoneally were young animals, and one received 10, the other 50 milligrammes; the other two were adults, one, the younger of the two, receiving 50 milligrammes, the other, several years old, 10 milligrammes.

One of the puppies (No. 33) and the young adult (No. 31) died of general tuberculosis in 32 and 31 days respectively, the disease in each case was very severe and tubercle bacilli were very numerous all over the body; the omentum was greatly thickened and composed of necrotic areas surrounded by trabeculae of fibroid tissue, the peritoneal cavity was full of serous fluid; the sternal and most of the abdominal lymphatic glands were enlarged and caseating; there were numerous submiliary grey tubercles in the lungs and liver and a few in the kidneys; the spleen of one was greatly enlarged and peppered with grey foci, that of the other showed necrotic patches and yellow and grey foci in the depth.

The other puppy, No. 27, inoculated with 10 milligrammes, died in 61 days and showed general tuberculosis similar to but less severe than that in the two just described; the pleural cavities in this case were, however, filled with fluid.

The fourth dog, No. 29, which was the mother of dog 27, was killed when very ill 413 days after inoculation; it showed chronic general tuberculosis; there were fibro-caseo-necrotic masses in the large and small omentum, some of the abdominal glands were tuberculous, there were a few tubercles in each kidney and four caseous masses and two small tubercles in the lungs; there were no tubercles in the liver or the spleen; the pericardial sac and the right pleural cavity were filled with serous fluid and the right lung was almost completely collapsed, there was fluid also in the left pleural cavity; the illness of the animal was due to pleural and pericardial effusion.

The dog inoculated intravenously was a puppy (No. 43) and received 1 milligramme of culture from Virus H. 81. "P.W."; it died in 33 days of acute tuberculosis, the immediate cause of death apparently being a ruptured blood-vessel in the omentum; there were numerous submiliary grey tubercles in the lungs and spleen which was very large, and the bronchial and portal glands were in a state of early consolidation; tubercle bacilli were numerous in the liver, spleen, and affected glands.

The dog is resistant therefore to human tubercle bacilli inoculated subcutaneously but develops general tuberculosis when the bacilli are inoculated intraperitoneally or intravenously. The disease produced by the intraperitoneal inoculation of large doses (50 and 10 milligrammes) is usually rapidly fatal and characterised by the presence in the lesions of large numbers of tubercle bacilli; when smaller doses are inoculated into the peritoneal cavity the disease is less severe and not fatal and the lesions exhibit retrogressive characters.

Results very similar to these were obtained in dogs by the inoculation of bovine tubercle bacilli (see Vol. I of the Appendix to the Second Interim Report, page 397).

Of six dogs inoculated subcutaneously two showed no lesion at the seat of inoculation, no disease of the nearest glands, and no naked-eye evidence of tuberculosis in the internal organs; in each of the other four there were a healing local lesion and scattered tubercles in the lungs, in two there were minute tubercles in the liver; and in only one was there definite tuberculosis of the nearest glands. Three dogs were inoculated intraperitoneally, one with an emulsion of tuberculous tissues (dose 10·15 million tubercle bacilli) and two each with 1 milligramme of culture; the former animal died in 71 days of severe generalised tuberculosis; one of the two latter died in 32 days of tuberculous peritonitis and early general tuberculosis, the other survived and when killed 156 days later showed definite tuberculous lesions (a few fibrous nodules) in the lungs only.

The effects produced in the dog by the human tubercle bacillus are identical therefore with those produced by the bovine tubercle bacillus.

INOCULATION EXPERIMENTS ON CATS.

Tabular Summary, pages 246–249.

With Human Tubercle Bacilli.

Eight strains of culture with the cultural characters and virulence of the human tubercle bacillus have been tested on cats.

Twenty-one cats have been inoculated, ten intraperitoneally, nine subcutaneously, and two intramuscularly; eight of the cats were adults, the rest were young animals; the doses varied from 0·01 milligramme to 50 milligrammes.

Four of the eleven animals inoculated subcutaneously or intramuscularly died prematurely. Another (an adult, dose 50 mg.) died in 29 days apparently from the toxic effects of a large suppurating local lesion; the nearest glands were caseous, but there were no macroscopic lesions in the internal organs. The remaining six animals died or were killed in periods varying from 72 to 162 days and the disease was confined to the seat of inoculation or to the seat of inoculation and the nearest glands.

Of the ten animals (5 cats and 5 kittens) inoculated intraperitoneally one, an adult, dose 50 milligrammes, died in 56 days and showed slight generalised tuberculosis, the organs affected being the lungs which contained scattered caseous nodules and tubercles, and the kidneys, the cortices of which showed miliary tubercles and the medullae caseous nodules and streaks. The other four cats inoculated intraperitoneally died in 77 to 94 days; one showed disease of the omentum and a few tubercles in the lungs, another local tuberculosis only, a third showed tuberculosis of the lungs only, and a fourth died of spontaneous tuberculosis.

Of the five kittens one died prematurely. The others were killed after 146 to 162 days; two were free from tuberculosis, the other two each showed a few tubercles in the omentum only.

These results show therefore that the cat is very resistant to the human tubercle bacillus.

With Bovine Tubercle Bacilli.

The cat is much more susceptible to the bacilli which are highly virulent for the calf and rabbit.

Two adult cats were inoculated, one subcutaneously the other intraperitoneally, each with 1 milligramme of culture from Virus H. 69. "F.K." (a case of primary abdominal tuberculosis due to infection with the bovine tubercle bacillus). The animal intraperitoneally inoculated died in 17 days of acute tuberculosis; the animal inoculated subcutaneously was killed when ill 36 days after inoculation and showed general tuberculosis, the lungs liver and spleen were beset with miliary tubercles and numerous tubercle bacilli were found in the faeces and a few in the bone marrow.

Two other cats were inoculated, with an easy-growing culture (H. 13. "A.D.", Calf 301) which was subsequently shown to be a mixture of human and bovine tubercle bacilli; each cat received 20 milligrammes in the peritoneal cavity. One was killed in 12 days when dying, the other died in 15 days, of acute tuberculosis; there were no definite tuberculous lesions in the organs except in the liver of one which showed numerous grey foci, but tubercle bacilli were very numerous in smear preparations made from different tissues.

These results are in agreement with those obtained by the inoculation of tubercle bacilli obtained directly from bovine tuberculous lesions. (*See* 2nd Interim Report, Appendix, Vol. I., page 407.)

Twelve cats, six of which were kittens, were inoculated, ten subcutaneously and two intraperitoneally, with doses of cultures of bovine tubercle bacilli which varied from 0·01 to 1 milligramme. All with one exception died, in periods varying from 17 to 70 days, and showed generalised tuberculosis, the kittens being more acutely affected than the cats. The exceptional cat was killed in 74 days in apparent good health, but it also had generalised tuberculosis.

These experiments showed not only that tuberculosis is readily set up in cats by the subcutaneous or the intraperitoneal inoculation of bovine tubercle bacilli, but also that kittens are more susceptible than the adult cat.

INOCULATION EXPERIMENTS ON RATS.

Tabular Summary, page 252.

Cultures from two of the slightly virulent viruses, viz.: H. 70. "N.W." and H. 81. "P.W.", have been tested on rats; two rats were inoculated with each culture, one subcutaneously and one intraperitoneally, the dose in each case being 10 milligrammes.

Subcutaneous inoculations were made because among the experiments recorded in the second interim report there was none in which cultures of human tubercle bacilli had been inoculated in this way.

One of the rats inoculated subcutaneously died in 74 days from impaction of faeces in the colon and showed a lesion at the site of inoculation only. Tubercle bacilli were, however, found in the adjacent glands, lung and spleen. The other subcutaneous rat died 454 days after inoculation; there was no sign of disease anywhere in the body but tubercle bacilli were found in the lung; there were no tubercle bacilli in the spleen or the nearest glands; a culture was obtained direct from the lung, and this resembled the culture inoculated in cultural characters and virulence.

The two animals inoculated intraperitoneally died in 53 and 58 days respectively and showed macroscopically and microscopically the appearances which are characteristic of the disease in fatally infected rats.

The rat reacts to mammalian tubercle bacilli in a manner different from almost every other species of animal.

When large doses of tubercle bacilli, whether of the human or of the bovine type, are inoculated into the peritoneal cavity of a rat, the bacilli progressively multiply in the tissues until finally they bring about the death of the animal; death is due, not as in most animals to loss of function of essential organs from the growth in them of tuberculous masses, but apparently to the toxic effects of large numbers of bacilli. Although the tissues may be swarming with bacilli there is remarkably little tissue reaction and no production of the lesions characteristic of tuberculosis.

The lungs show changes more frequently than other organs and in them tubercle bacilli are usually most numerous; they are often enlarged, reddish in colour throughout or in patches, and firmer than normal, and show on the surface a curious grey or greyish-yellow mottling; sometimes the lungs are only congested or voluminous and emphysematous. The spleen is often enlarged and fine grey points may be seen just under the capsule. The ventral mediastinal glands are usually congested and enlarged and in the omentum or on the peritoneum there may be a few yellow nodules containing pus which microscopically is composed mainly of tubercle bacilli.

In the experiments recorded in the Second Interim Report rats inoculated with bovine tubercle bacilli generally succumbed sooner than rats inoculated with larger doses of human tubercle bacilli, *e.g.*, eight rats inoculated intraperitoneally each with 10 milligrammes of bovine bacilli died of acute tuberculosis in periods varying from 39 to 116 days (average 68 days), while six rats inoculated with human tubercle bacilli, doses 74 to 100 milligrammes, died in periods varying from 87 to 413 days (average 174 days).

The difference in duration of life seemed to indicate that the bovine tubercle bacillus was more virulent for the rat than the human tubercle bacillus; this view is not supported by the recent experiments, which show that there are human tubercle bacilli which are as fully virulent for the rat as bovine tubercle bacilli.

To small doses of tubercle bacilli inoculated intraperitoneally, or large doses subcutaneously, the rat is very resistant; the bacilli are disseminated into the organs, but undue multiplication does not take place, and the bacilli reside in the tissues without producing harmful effects; they retain their vitality for long periods; living bacilli were demonstrated in a rat inoculated intraperitoneally with bovine tubercle bacilli 268 days after inoculation, and in the lung of another, inoculated subcutaneously with human tubercle bacilli, 454 days after inoculation.

INOCULATION EXPERIMENTS ON WHITE MICE.

Tabular Summary, page 253.

With Human Tubercle Bacilli.

Seven mice have been inoculated with human tubercle bacilli, three subcutaneously and four intraperitoneally, the doses varying from 1 to 50 milligrammes.

One of the mice inoculated subcutaneously died in 37 days and showed a local lesion and consolidation (red hepatisation) of the lungs; a moderate number of tubercle bacilli were found in the lung and none in the liver, spleen, and kidney. Another died in 61 days and showed local tuberculosis only; tubercle bacilli were found in the iliac gland and the spleen and none in the lungs. The third died in 103 days and showed no macroscopic tuberculosis, but tubercle bacilli were found in the inguinal gland and lung.

The four mice inoculated intraperitoneally died in 8, 12, 26, and 103 days respectively and showed numerous tubercle bacilli in the organs but no tuberculous lesions.

Mice react, therefore, to the human tubercle bacillus in much the same way as rats; the bacilli introduced intraperitoneally multiply freely in the tissues and cause death without setting up characteristic tuberculous lesions. The mouse, however, appears to be more susceptible than the rat; all the mice inoculated intraperitoneally died in a much shorter time than rats inoculated with equivalent doses, and one of the mice inoculated subcutaneously died of pneumonia caused apparently by the tubercle bacillus.

With Bovine Tubercle Bacilli.

No mice have been inoculated with cultures of bovine tubercle bacilli, but 14 were inoculated with emulsions of bovine tuberculous tissues, seven subcutaneously and seven intraperitoneally. (*See* Volume I of Appendix to the Second Interim Report.)

The subcutaneous mice died in periods varying from 40 to 281 days and showed in one no disease at all and in the others a local lesion only; the mouse is therefore resistant to small doses of bovine tubercle bacilli inoculated subcutaneously.

The seven mice inoculated intraperitoneally died in periods varying from 39 to 139 days, and in all cases death appeared to be due to the multiplication of bacilli in the tissues. A characteristic feature of the disease in these intraperitoneally inoculated animals in contrast to that in rats similarly inoculated was the occurrence in the peritoneal cavity of thin-walled nodules filled with yellow pus composed largely of tubercle bacilli, and similar nodules were sometimes found in the thorax; the lungs were congested and sometimes partly consolidated and mottled on the surface with grey or greyish-yellow foci; in one case the lung was almost completely consolidated firm and greyish-white.

These experiments showed that the mouse is susceptible to the bovine tubercle bacillus inoculated intraperitoneally, and they showed as do the experiments with human tubercle bacilli that the mouse is more susceptible than the rat; four rats inoculated at the same time as the mice with equivalent doses of the emulsions remained healthy.

INOCULATION EXPERIMENTS ON FOWLS.

Tabular Summary, pages 259–263.

The virulence of 13 cultures of tubercle bacilli derived from human tuberculous lesions has been tested on fowls.

The cultures used included various types of tubercle bacilli; nine were obtained from cases of lupus,* one from a tuberculous abscess, one from tuberculous mesenteric glands, one from a tuberculous lung, and one from sputum from a case of pulmonary tuberculosis; the last four cultures and three of the lupus cultures grew luxuriantly on artificial media and had low virulence for the calf and rabbit; the remaining six lupus cultures grew like bovine tubercle bacilli, and of these five exhibited intermediate virulence and one low virulence for the calf and rabbit.

Altogether thirty-two fowls have been inoculated, twenty-six intravenously, three intraperitoneally, and three subcutaneously or intramuscularly, the doses varying from 1 to 50 milligrammes.

Of the fowls inoculated intravenously three died within a few days of their inoculation.

Two others inoculated with the lupus culture H.53. "D.H." died in twelve and fourteen days respectively of rupture of the spleen which was much enlarged; there were no macroscopic lesions of tuberculosis anywhere in the body, but smear preparations showed numerous tubercle bacilli in the lung, liver and spleen, and a few in the kidneys.

Two, inoculated each with 10 milligrammes of the lupus culture H.107. "H.H." and one inoculated with 50 milligrammes of the sputum virus H. 118. "F.C." died in 30, 32, and 32 days respectively. They died of toxaemia, the spleen in each case being enlarged and the liver soft and ruptured; there were no macroscopic tubercles in the organs, but tubercle bacilli were found in smear preparations.

Another fowl inoculated with 10 milligrammes died of tuberculosis in 28 days and showed minute foci in the lungs (which were dark red), liver, spleen, and kidneys. Another died in 45 days of intercurrent disease and about half a dozen small tubercles were found in the lungs.

Two fowls died of other causes in 98 and 207 days and showed no tuberculosis.

The remaining 14 fowls inoculated intravenously were killed after periods varying from 90 to 239 days. One of these, inoculated with 10 milligrammes of H. 91. "H.S.", showed early tuberculosis of the intestines, five nodules in the spleen and a grey focus in the liver. A culture obtained from one of the spleen nodules exhibited typical avian characters and there is little doubt but that the fowl was suffering from spontaneous avian tuberculosis.

In three there were two or three minute tubercles in the lungs and four others showed a minute focus or two in the liver in only one of which tubercle bacilli were found.

The rest (seven in number) showed no sign of tuberculosis anywhere in the body.

Of the three fowls inoculated intraperitoneally one showed two tubercles in the liver (tubercle bacilli), one a doubtful focus in the liver, and the other two yellow foci on a fold of peritoneum near the spleen.

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* The experiments on the fowl with lupus cultures are given in this report instead of in that dealing with lupus viruses in order that all experiments made on the fowl with mammalian tubercle bacilli of human origin may be considered together.

In the fowls inoculated subcutaneously or intramuscularly local tuberculosis only was produced.

These experiments show clearly that the fowl is highly resistant not only to tubercle bacilli which grow well on artificial media and have low virulence for the calf and rabbit, but also to those which grow like bovine tubercle bacilli and have intermediate virulence.

Large doses of culture (10 to 50 milligrammes) inoculated intravenously sometimes cause a fatal result in fowls within a few weeks (in this series 6 out 18), the fowl showing at the post-mortem examination a congested and oedematous condition of the lung, an enlarged spleen, and a pale soft liver, both of which are occasionally ruptured, and microscopically numerous tubercle bacilli in the organs. Minute grey or greyish-yellow foci are sometimes seen in the organs. Five out of the six acutely-infected fowls were inoculated with lupus bacilli with the cultural characters of bovine tubercle bacilli.

The other fowls inoculated intravenously, and all those inoculated intraperitoneally or subcutaneously showed either a few insignificant foci in some of the organs but more often no disease at all.

The result of the investigation of cultures from these fowls are given in the tabular summary of the experiments (page 259 *et seq.*)

Fowls Inoculated with Dead Tubercle Bacilli.

The action of dead human tubercle bacilli has been tested by the inoculation intravenously of culture killed by exposure to steam at 100° C.; the culture used was a broth culture of H. 115. "N.G.", and three fowls were inoculated each with 100 milligrammes.

One of the fowls killed 40 days after inoculation showed extensive consolidation of the lungs (grey hepatisation) and thickening of the margins of the alveoli in the crepitant portions, the liver was pale and showed scattered yellow foci, the spleen was enlarged; there were no definite tubercles in any of the organs.

Another of the fowls died in 45 days; the body was much emaciated but there was no sign of disease in any of the organs; tubercle bacilli were fairly numerous in a smear preparation made from the lungs.

The third fowl was killed 263 days after inoculation; it was fat and the organs were perfectly normal to the naked eye.

INOCULATION EXPERIMENTS ON PARROTS.

Tabular Summary, page 256.

Five parrots have been inoculated with culture from a tuberculous human lung (Virus H. 81. "P.W."); three of these were inoculated intravenously, one intraperitoneally, and one intramuscularly, the doses varying from 0·1 to 10 milligrammes. Two parrots were inoculated cutaneously with lupus cultures (H. 99 and H. 102).

All the cultures grew luxuriantly on glycerin media, and were only slightly virulent for the calf and rabbit.

Two of the parrots were West African grey parrots, and were inoculated intravenously, one with 10 the other with 2 milligrammes; they died in 9 and 20 days, and showed numerous tubercle bacilli in the organs but no definite tuberculous lesions.

The other five parrots belonged to an Australian species. One, inoculated intravenously with 0·1 milligramme, was killed after 298 days and showed a few minute tubercles in the liver and kidneys and a few doubtful foci on the peritoneum. The one inoculated intraperitoneally (dose 1 milligramme) died in 129 days and showed tuberculous peritonitis and slight tuberculosis of the pleura. The parrot inoculated intramuscularly (dose 10 milligrammes) was killed after 269 days; besides a cheesy local lesion and caseation of an adjacent gland there were numerous minute tubercles in the liver and a few in the lungs and kidneys and moderately severe tuberculosis of the heart muscle.

The two parrots inoculated cutaneously were scarified, one at the root of the beak, the other behind the right ear, with a scalpel which had been previously dipped into a turbid suspension of culture.

One of the parrots (Virus H. 99. "L K.") died 250 days after inoculation; there was no local lesion, the lungs were diffusely hepatised and contained numerous discrete miliary tubercles with caseous centres, the liver was closely peppered with minute greyish-white tubercles, the spleen was slightly enlarged and showed scattered greyish-white foci beneath the capsule, and there were a few miliary grey tubercles in the cortex of each kidney.

This result was more severe than after the intravenous inoculation of 0·1 milligramme or the intramuscular inoculation of 10 milligrammes.

The other parrot inoculated cutaneously (Virus H. 102. "N.H.") was killed after 522 days and showed a mild form of general tuberculosis. There was no local lesion; the lungs contained a few minute tubercles (smear, a few T.B.), the liver was peppered with minute tubercles; the spleen was enlarged, and there were some tuberculous foci in the pectoral muscles (smear, one T.B. found).

Cultures were recovered from four of the parrots and all were found to resemble exactly the culture inoculated.

The above experiments show that general tuberculosis is readily produced in parrots by tubercle bacilli which grow luxuriantly and have low virulence for the calf and rabbit, and this result was obtained not only after intravenous inoculations but also after intramuscular and cutaneous. In fowls, on the other hand, which were inoculated intramuscularly or subcutaneously, the disease was confined to the site of inoculation.

FEEDING EXPERIMENTS.

The feeding experiments detailed in this volume are divided into two series; one containing those which lasted several months, the other those which were terminated after short periods.

The experiments in the first series were made for the purpose of observing the effects produced in different species of animals by the human tubercle bacillus when introduced into the alimentary tract, and are in continuation of similar experiments published in the 2nd Interim Report.

The experiments in the second series were made for the purpose of obtaining information as to the dissemination of tubercle bacilli within short periods of their introduction into the alimentary canal.

Each series of experiments is considered separately.

Feeding Experiments of long duration.

(*See page* 265 *et seq.*)

In this set there are 38 animals of which 5 are swine, 2 goats, 1 a horse, 2 dogs, 6 cats, 3 monkeys, 4 rabbits, 10 guinea-pigs, 2 fowls, and 3 parrots; all these animals were fed with cultures of the human tubercle bacillus (Group II.).

SWINE. (*See page* 266.)

Four of the five swine were fed with culture from Virus H. 68. "R.B." (bone tuberculosis), and form a special series. The fifth was fed with culture from H. 70. "N.W." (abdominal tuberculosis) and received 50 milligrammes in a single dose. In this animal, killed 154 days after it was fed, the disease was confined to the alimentary tract lymphatic glands which contained calcareo-caseous nodules.

Two of the series of four swine received a single dose of 50 milligrammes of culture while the other two were fed every week for 19 weeks (the initial dose being in each case 50 milligrammes) and received during this period altogether 1·5 grammes.

The animals which received a single dose of culture were killed after 178 and 378 days respectively; both showed retrogressive tuberculosis of the glands of the alimentary tract, and one had in addition a tubercle or two in a portal gland, while the other showed a tubercle or two in the portal and thoracic glands and in the lungs.

One of the swine fed many times was killed 176 days, the other 377 days after the first feed, the durations of life thus corresponding with those of the pigs fed with a single dose. In each case the glands of the alimentary tract were tuberculous, containing tubercles and nodules which in the first were caseo-calcareous and in the second calcareous; the lungs of both contained sparsely scattered tubercles and a portal gland of one a calcareous tubercle.

Although the two latter animals received altogether about thirty times as much culture as the two fed with a single dose there was practically no difference in the amount of disseminated disease produced.

Cobbett fed five pigs with cultures of human tubercle bacilli, each pig receiving a single dose (four 50 mgs. and one 1 mg.), and two with sputum. (*See* Vol. II of Appendix to 2nd Interim Report, pp. 1160–1161.)

Of the five pigs fed with cultures, one killed 92 days after a dose of 50 milligrammes was free from tuberculosis; another fed at the same time with an equivalent dose of the same culture showed after 93 days a hempseed-sized nodule in the lung, and no disease elsewhere. The other three each showed calcareous or calcareo-caseous nodules in the glands of the alimentary tract and two or three small tubercles in the lungs, and in one there were caseous foci in the portal glands.

One pig was fed with the mixed sputum of phthisis patients almost daily during a period of 159 days; another was fed almost daily for 236 days.

The first was killed 159 days after the experiment began and showed calcareous tuberculosis of the submaxillary glands, and one mesenteric gland and three tubercles of a doubtful nature on the surface of the liver. The second killed 376 days after the experiment began and 140 days after the last dose showed retrogressive calcareous tuberculosis of the submaxillary glands, two calcareous tubercles in the mesenteric glands, and a group of little tubercles in the lung.

The seven old and the five recent experiments prove conclusively that the human tubercle bacillus is unable when ingested to set up anything more than a limited retrogressive tuberculosis in swine, and that repeated doses during long periods are not more effective than a single dose.

Microscopical examination of smear preparations showed that tubercle bacilli were very scanty in the lesions; in the majority of instances the examination was negative, and when positive it was generally only after prolonged search that a bacillus was demonstrated.

Though human tubercle bacilli do not thrive in the tissues of swine they remain alive in lesions and sometimes in normal tissues for considerable periods, as has been shown by inoculating emulsions into guinea-pigs. (*See* Tables, p. 51.)

In none of the above pigs were tuberculous lesions found in the mucous membrane of the alimentary tract (the tonsils of one pig contained a few calcareous grains of a doubtful nature) although in ten the glands draining it were tuberculous; the bacilli had passed through without leaving any mark of their passage; in one case there was a lesion in the lungs and no disease of the glands of the alimentary tract.

GOATS. (*See page* 267.)

The two goats were both adults. One received 50 milligrammes of H. 68. "R.B." (bone tuberculosis), the other 74 milligrammes of H. 76. "G.M." (joint tuberculosis), and were killed 93 and 328 days later respectively.

In each case the glands of the alimentary tract (neck and abdominal) showed discrete calcareo-caseous or calcareous tubercles or nodules and there was no sign of tuberculosis elsewhere.

HORSE. (*See page* 267.)

An aged pony was given in its drinking water from 100 to 150 milligrammes of culture from H. 81. "P.W." (lung tuberculosis) and was killed 130 days later.

At the post-mortem examination no tuberculous lesions were found in any of the organs or glands of the body, and guinea-pigs inoculated with emulsions of the spleen, liver, submaxillary and bronchial glands did not develop tuberculosis.

DOGS. (*See page* 268.)

Two dogs were fed, one with culture from H. 70. "N.W." the other with culture from H. 81. "P.W.", each receiving at one meal (of milk) 50 milligrammes. They were killed 99 and 102 days later respectively.

One showed a few yellow foci in a retroperitoneal gland (tubercle bacilli) and a mesenteric gland (no tubercle bacilli) and three minute grey foci in the liver. The other was perfectly healthy.

Cobbett fed four dogs with tubercle bacilli of Group II (*see* Vol. II of Appendix to 2nd Interim Report, p. 1176). One of these, dose 10 milligrammes, died 94 days later of pneumothorax and empyema; the lungs were tuberculous and the mesenteric glands showed scattered opaque white points in the cortices. This result was exceptional, and suggested that the tubercle bacilli causing the disease had been inhaled.

The other three dogs, fed with 10, 1, and 0·1 milligrammes respectively, showed after 100, 191, and 100 days no lesions of a definitely tuberculous nature.

CATS. (*See page* 268.)

Three cats and three kittens were fed with culture from various human viruses; each of the cats received a single dose in milk (two 50 milligrammes and one 10 milligrammes); the three kittens were fed on three successive days receiving altogether between them 114 milligrammes.

All the animals were killed in from 98 to 110 days and showed no sign of tuberculosis.

RABBITS. (*See page* 270.)

Four rabbits have been fed each with 10 milligrammes of a Group II culture. One died 21 days later, and two caseous nodules were found in the lungs and no disease elsewhere. Another killed after 188 days showed a caseating nodule in the lung and no other tuberculous lesions. Another killed after 183 days showed three or four calcareous grains in one submaxillary gland and was otherwise normal. The fourth after 181 days was free from tuberculosis.

Seeing that the culture was administered to these rabbits by means of a pipette it appears probable that the tuberculosis of the lungs in the first two cases was caused by bacilli which had been accidentally inhaled.

RHESUS MONKEYS. (*See page* 269.)

Three rhesus monkeys were fed by Dr. Cobbett with culture derived from the mesenteric gland of H. 60. "W.B."; this culture exhibited the properties (cultural characters and virulence) of a human tubercle bacillus; the culture suspended in saline was drunk by the monkeys from a pipette.

Two of the monkeys received each 1 milligramme, the third received 0·1 milligramme.*

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* These experiments are referred to by Dr. Cobbett in his report, but the full post-mortem notes are given in this; their publication was deferred pending further work with one of the strains (the bronchial gland strain) of the virus which had exhibited exceptional features.

All the monkeys died of general tuberculosis in from 50 to 84 days. The disease in each case was characterised by slight tuberculosis of the alimentary tract and adjacent glands and severe tuberculosis of the lungs which were in a condition of caseous pneumonia; the abdominal organs were also tuberculous.

The type of tuberculosis in the lungs of each of these cases suggests that some of the emulsion was insufflated while the animal was being fed. Monkeys which have ingested tuberculous material in a natural manner have almost invariably shown tuberculous ulcers in the intestines and enlargement and caseation of the glands of the alimentary tract, while the lungs have contained discrete tubercles or nodules and not the large caseating pneumonic areas seen in these cases.

GUINEA-PIGS. (*See page* 270.)

Ten guinea-pigs have been fed with culture from the two slightly virulent viruses H. 68. "R.B." and H. 70. "N.W."; six guinea-pigs received 10 milligrammes each, two one milligramme each, and two 0·1 milligramme each.

All the guinea-pigs died of general tuberculosis in periods varying from 72 to 206 days. The severe tuberculosis of the lungs in many of these cases was probably caused by bacilli which had been inhaled when the culture emulsion was pipetted into the mouth of the animal.

FOWLS. (*See page* 263.)

Two fowls were fed weekly for three weeks with a culture of the human tubercle bacillus obtained from a tuberculous sacrum (H. 68. "R.B."), one receiving altogether 150, the other 250 milligrammes. They were killed after 138 days and found to be free from any sign of tuberculosis.

PARROTS. (*See page* 258.)

Three parrots were fed with cultures of the human tubercle bacillus obtained from cases of pulmonary tuberculosis. One, No. 11, which was given a dose of 50 milligrammes from a pipette, died 73 days later of general tuberculosis mainly affecting the respiratory regions. This experiment is not a true feeding experiment, as there is no doubt that the bacilli were inhaled at the time of feeding. The other two, Nos. 17 and 19, were fed with culture in their drinking water, each receiving the growth from four serum cultures. They were killed after 270 days; one showed a caseous tubercle in the lung, the other was healthy.

Summary.

These feeding experiments show that the animals—the pig, the goat, the horse, the dog, the cat, and the rabbit—which are resistant to the human tubercle bacillus inoculated subcutaneously are just as resistant to the bacillus when absorbed from the alimentary tract. The fowl and the parrot also resisted infection.

The monkey and the guinea-pig were the only animals to develop generalised progressive tuberculosis, but the experiments with them are unsatisfactory as it is probable that tubercle bacilli were insufflated into the lungs at the time of feeding.

Feeding Experiments of Short Duration. For details see pages 521 *to* 531; *for table of results see page* 52.

The object of the experiments in this series was to ascertain whether mammalian tubercle bacilli are able to travel directly from the alimentary canal through the adjacent lymphatic glands into tissues beyond.

Experiments which were designed to throw light upon this problem have already been published in the 2nd Interim Report (Appendix, Vol. I, page 696), and these I will summarize before describing the recent experiments.

Summary of previous experiments.

Dogs. Thirteen dogs were fed after fasting for 24 hours with large doses of bovine tubercle bacilli, sometimes from culture tubes but generally from tuberculous animals, mixed with milk or cream.

Of these thirteen, nine were killed in periods varying from three to six-and-a-half hours after the experimental meal. Emulsions of the mesenteric glands of six of the animals did not produce tuberculosis in guinea-pigs nor did chyle collected from the thoracic duct in the neck previous to the animals' death. All the mesenteric glands of these animals were not emulsified, so it is not possible to say that no tubercle bacilli had passed from the canal into the mesenteric glands, but sufficient material was investigated to conclude that if any at all were absorbed their number must have been very small. It is interesting to note that numerous tubercle bacilli were demonstrated in the contents of the small intestine examined after death.

Emulsions of the mesenteric glands of the other three produced tuberculosis in guinea-pigs but chyle collected from the thoracic duct was not infective; emulsions of the lung in one case and of the liver in another also did not produce tuberculosis in guinea-pigs.

The remaining four of the thirteen dogs were killed 24, 24, 28½ and 96 hours respectively after feeding; the first of these is excluded from further consideration as most of the guinea-pigs inoculated died of an acute infection. Emulsions of the mesenteric glands of the other three produced tuberculosis in guinea-pigs; chyle from each animal collected just before death did not cause tuberculosis; the results of the inoculation of emulsions of the lungs were negative in the case of the first dog (24 hours), doubtful in that of the second (28½ hours), and positive in that of the third (96 hours).

Pigs. Five pigs were fed with emulsions of tuberculous tissues containing large numbers of bovine tubercle bacilli; they were killed 5 hours, 1, 2, 4 and 18 days later respectively.

In the pig killed 5 hours after the experimental meal no tubercle bacilli were demonstrated in the mesenteric glands, lung or liver, though tubercle bacilli were numerous in the contents of the duodenum and ileum.

The mesenteric glands of the second pig produced tuberculosis in a guinea-pig but emulsions of the lungs, bronchial glands, spleen and liver gave negative results.

No tubercle bacilli were demonstrated anywhere in the third and fourth pigs either microscopically or by means of guinea-pigs (the guinea-pigs inoculated with the mesenteric glands of the fourth died of an acute infection).

Emulsions of the mesenteric glands, lung, spleen, and bronchial glands of the fifth pig, which was allowed to live 18 days, caused tuberculosis in guinea-pigs; an emulsion of liver did not produce tuberculosis. Beyond a slight hardening of the mesenteric glands, nothing abnormal was found at the post-mortem examination of the latter animal.

These experiments on dogs and pigs proved conclusively that the bovine tubercle bacillus can pass through the mucous membrane of the intestines within a comparatively short space of time after ingestion and become lodged in the lymphatic glands draining it. The results with the animals killed within 6½ hours of the experimental meal indicate that the number passing through the intestinal wall with the chyle of the meal is small. Having arrived in the mesenteric glands, bacilli do not apparently at once travel onwards, but remain there for some time, as tubercle bacilli were not demonstrated with certainty in the lungs within four days of their ingestion. The result in the pig killed 18 days after it was fed cannot be brought forward as evidence that tubercle bacilli can pass directly into the lungs, but it does show that tubercle bacilli may be disseminated all over the body of a pig before macroscopic tuberculous lesions have had time to develop in the glands adjacent to the site of entry of the bacilli.

Recent experiments.

The recent experiments include nine pigs, three rhesus monkeys, a goat, and a cat.

These animals were given large doses of tubercle bacilli mixed with their ordinary food which was in the majority of instances eaten at one meal. By adopting the natural method of feeding one avoids the objections that can be raised against experiments in which an operation has been performed or a stomach tube introduced; in the one case there is the possibility that bacilli may be absorbed by the injured tissues and rapidly disseminated over the body, and in the other that bacilli may be accidentally insufflated into the trachea. The animals' houses were every day carefully cleansed of their faeces to prevent any possibility of an aerogenous infection of the lungs.

Pigs. Two of the pigs were fed with cultures of bovine tubercle bacilli, two with emulsions of the tuberculous organs of guinea-pigs which had been inoculated with human tubercle bacilli; the rest of the animals were fed with cultures of human tubercle bacilli (doses 50 to 377 milligrammes).

The animals were killed in periods varying from two to thirteen days and emulsions of various organs and glands were inoculated into guinea-pigs.

The two pigs, Nos. 141 and 143, fed with bovine tubercle bacilli were killed seven and thirteen days later, and in each case tubercle bacilli were demonstrated in the submaxillary and mesenteric glands and the lungs; experiments with other tissues (liver, spleen, bronchial gland, and blood) were negative.

The seven pigs fed with human tubercle bacilli were killed after 2, 4, 5, 7, 7, 7, and 12 days respectively; tubercle bacilli were demonstrated in each case in the mesenteric glands and in four in the submaxillary glands; in two cases (duration 7 days) tubercle bacilli were demonstrated also in the lungs but not in the liver and spleen; emulsions of the lung, liver, spleen, bronchial gland and muscle, and the blood of the other pigs gave negative results in guinea-pigs.

The three rhesus monkeys were fed each with 50 milligrammes of human tubercle bacilli and were killed 2, 4, and 6 days later respectively. In each case emulsions of the submaxillary and mesenteric glands and the lung, liver, and spleen were inoculated into guinea-pigs.

The emulsions of the tissues of the two days monkey did not produce tuberculosis in any of the guinea-pigs inoculated; all the guinea-pigs belonging to the four days monkey (except those inoculated with the submaxillary glands) developed tuberculosis; of the guinea-pigs belonging to the six days monkey those inoculated with emulsions of the submaxillary glands, mesenteric glands, and spleen became tuberculous, while those inoculated with liver remained healthy and those with lung died of an acute infection.

Goat. The goat (No. 73) was killed eight days after two doses, on successive days, of 50 milligrammes of human tubercle bacilli; tubercle bacilli were demonstrated in the submaxillary glands, mesenteric glands, and lung, but not in the liver or spleen.

Cat. The cat (No. 79) was killed nine days after a single dose of 50 milligrammes of the same culture as was used for the goat; tubercle bacilli were demonstrated in all the tissues inoculated, in the submaxillary and mesenteric glands, lungs, liver, and spleen.

Combining the results of the recent and the old experiments the following statements can be made with regard to dissemination of tubercle bacilli from the alimentary tract.

Tubercle bacilli are able to pass through the mucous membrane of the alimentary tract and to reach the adjacent lymphatic glands within a few hours of their ingestion. Only a small proportion of the bacilli ingested are absorbed, the rest passing out with the faeces. Of those that are absorbed the majority are arrested in the glands of the alimentary tract, but some, after a period the duration of which appears to vary with the animal used, are carried onwards into the lungs and even beyond.

The period of time between the ingestion of the bacilli and their demonstration in the lungs appears to me to have been too short for an active dissemination from a tuberculous focus to have taken place. The length of this period was in the majority of instances about a week, but in two instances (a dog and a monkey) bacilli were found to be present in the lungs within four days of their ingestion. (*See* Tables, pages 52 and 53.)

My results with feeding experiments of short duration, therefore, do not support the conclusion of other workers on this subject that tubercle bacilli can reach the lungs at the same rate as the chyle. Nor do they support the view that the lymphatic glands of the alimentary tract are an absolute barrier to the passage of ingested bacilli from the alimentary canal to the general circulation.

Dissemination after Subcutaneous Inoculation.

A pig was inoculated subcutaneously in the left ear with 20 milligrammes of a human (Group II) culture, and killed 24 hours later.

The blood and emulsions of the lung, liver, spleen, precrural gland, and bone marrow produced tuberculosis in guinea-pigs; an emulsion of muscle gave negative results in guinea-pigs. Cultures of the tubercle bacillus were obtained from the spleen (two colonies on three tubes); no colonies grew on tubes sown with blood marrow or liver tissue.

The experiment shows that human tubercle bacilli, subcutaneously inoculated, are taken into the blood stream and distributed over the body of a pig within 24 hours of their inoculation.

In a series of experiments on the same lines, published in the Appendix to the 2nd Interim Report (Vol. III, page 237), the same rapid dissemination of tubercle bacilli was demonstrated in eight different species of animals, the monkey, calf, pig, cat, rabbit, guinea-pig, rat, and fowl.

The rapidity with which tubercle bacilli are absorbed from the subcutaneous tissues is in strong contrast to the slowness of their absorption from the alimentary tract.

EXPERIMENTS MADE TO ASCERTAIN WHETHER LIVING TUBERCLE BACILLI EXISTED IN OLD CALCAREOUS LESIONS, OR IN APPARENTLY NORMAL TISSUES, OF SWINE EXPERIMENTALLY INOCULATED.

Number and Age of Swine.	Dose.	Distribution of Disease in Swine.	Duration of Experiment.	Tissue used for Guinea-pig Inoculation.	Naked-eye appearance of Tissue.	Result in Guinea-pig.
1 (9 weeks).	Large quantity of human sputum: Fed, 159 days.	Local T. only	159 days	Spleen	Normal	No tuberculosis.
3 (9 weeks).	Large quantity of human sputum: Fed, 236 days.	Local T., and a few tubercles in lungs.	376 days	Submaxillary gland.	Tuberculous	Tuberculosis.
75 (7 weeks).	1500·0 mg. of culture of human T.B. given during a period of 19 weeks.	Very slight generalised T.	176 days	Lung	Tuberculous	Tuberculosis.
				Liver	Normal	Tuberculosis.
				Spleen	Normal	No tuberculosis.
				Muscle	Normal	No tuberculosis.
77 (7 weeks).	1500·0 mg. of culture of human T.B. given during a period of 19 weeks.	Local T., and a few tubercles in lungs.	377 days	Submaxillary gland.	Tuberculous	Tuberculosis.
				Lung	Tuberculous	Tuberculosis.
				Spleen	Normal	No tuberculosis
81 (7 weeks).	50·0 mg. of culture of human T.B. as a single dose.	Very slight generalised T.	378 days	Submaxillary gland.	Tuberculous	Tuberculosis

EXPERIMENTS MADE TO ASCERTAIN WHETHER TUBERCLE BACILLI WERE PRESENT IN APPARENTLY NORMAL TISSUES OF SWINE ONE OR MORE MONTHS AFTER FEEDING WITH BOVINE TUBERCLE BACILLI.

Number of Swine.	Dose.	Distribution of Disease in Swine.	Duration of Experiment.	Tissue used for Guinea-pig Inoculation.	Result in Guinea-pig.
18	5·58 cc. of tuberculous milk estimated to contain one million T.B.	Very slight generalised T.	39 days	Spleen	No tuberculosis.
34	7·05 cc. of milk estimated to contain five million T.B.	Local T., and one or two disseminated lesions.	46 days	Spleen	Slight tuberculosis.
				Kidney	No tuberculosis.
26	55·85 cc. of milk estimated to contain ten million T.B.	G. T. moderately severe.	37 days	Left bronchial gland.	General tuberculosis.
				Kidney	No tuberculosis.
40	14·1 cc. of tuberculous milk estimated to contain ten million T.B.	Local T. only	45 days	Spleen	No tuberculosis.
38	5·58 cc. of milk estimated to contain one million T.B.	Very slight generalised T.	109 days	Spleen	No tuberculosis.
36	27·94 cc. of milk estimated to contain five million T.B.	G.T., not very severe	115 days	Liver	No tuberculosis.
74	1·36 cc. of milk estimated to contain 100,000 T.B.	Slight T. of neck glands, and one or two disseminated lesions.	42 days	Lung	No tuberculosis.
				Spleen	No tuberculosis.
64	13·6 cc. of milk estimated to contain one million T.B.	Slight T. of ileo-colic glands only.	42 days	Kidney	No tuberculosis.
66	13·6 cc. of milk estimated to contain one million T.B.	Slight T. of ileo-colic glands, and one or two disseminated lesions.	90 days	Spleen	No tuberculosis.

TABLE SHOWING THE EXTENT OF DISSEMINATION OF TUBERCLE BACILLI IN THE ANIMAL BODY WITHIN SHORT PERIODS OF THEIR INGESTION.

Virus.	Dose.	Number and Age of Animal.	Duration of Experiment.	Result of Inoculation of Tissues into Guinea-pigs.							
				Submax. Glands.	Mesenteric Glands.	Lung.	Liver.	Spleen.	Bronchial Gland.	Blood.	Muscle.
			PIGS.								
H.110. "J.B." (*b*) (Bovine virus from Lupus.)	50·0 mg. daily for two days.	141 (8 weeks.)	K. 7 days	+	+	+	—	—	—	—	
	Do.	143 (8 weeks.)	K. 13 days	+	+	+	—	—		—	
H. 104. "E.R." (Human.)	377·0 mg.	123 (16 weeks).	K. 5 days		+	—	—	—	—	—	—
H. 70. "N.W." (Human.)	50 0 mg.	105 (12½ weeks).	K. 2 days		+	—		—	—	—	
	50·0 mg.	103 (12½ weeks).	K. 4 days	—	+	—	—	—	—	—	—
H. 67. "E.P."... (Human.)	75·0 cc. of emulsion of G.P's. organs (T.B. numerous).	125 (12 weeks).	K. 7 days	+	+	—	—	—	—	—	—
	Do.	127 (12 weeks).	K. 12 days	+	+	—	—	—	—	—	—
H. 147. "P.C." (Human.)	100·0 mg.	149 (11 weeks).	K. 7 days	+	+	+	—	—			
	100·0 mg.	151 (11 weeks).	K. 7 days	+	+	+	—	—			

[*Continued on page* 53.]

TABLE SHOWING THE EXTENT OF DISSEMINATION OF TUBERCLE BACILLI IN THE ANIMAL BODY WITHIN SHORT PERIODS OF THEIR INGESTION—*continued.*

Virus.	Dose.	Number and age of Animal.	Duration of Experiment.	Result of Inoculation of Tissues into Guinea-pigs.							
				Submax. Glands.	Mesenteric Glands.	Lung.	Liver.	Spleen.	Bronchial Gland.	Blood.	Muscle.
		RHESUS MONKEYS.									
H. 147. "P.C." (Human.)	50·0 mg.	371 (young animal).	K. 2 days	–	–	–	–	–			
	50·0 mg.	373 (young animal).	K. 4 days	–	+	+	+	+			
	50·0 mg.	375 (young animal).	K. 6 days	+	+	Died prematurely.	–	+			
		GOAT AND CAT.									
H. 147. "P.C." (Human.)	50·0 mg. daily for two days.	Goat 73 (adult).	K. 8 days	+	+	+	–	–			
	50·0 mg.	Cat 79 (adult).	K. 9 days	+	+	+	+	+			

MODIFICATION EXPERIMENTS WITH HUMAN TUBERCLE BACILLI.

MODIFICATION EXPERIMENTS WITH HUMAN TUBERCLE BACILLI.

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MODIFICATION EXPERIMENTS WITH HUMAN TUBERCLE BACILLI.

GENERAL INTRODUCTION.

This report deals with the experiments and observations made with the object of determining whether or no tubercle bacilli isolated from human tuberculous lesions can be modified by passage through the animal body. The modification experiments with lupus bacilli are given in the Report on Lupus Viruses.

The first part of the report gives an account of the results of passage of the human tubercle bacillus (Group II) through the bodies of mammals.

The second part contains the results of the passage of various types of tubercle bacilli derived from human tuberculous lesions through the bodies of fowls and pigeons.

PART I.

MODIFICATION EXPERIMENTS WITH THE HUMAN TUBERCLE BACILLUS (GROUP II) IN THE BODIES OF MAMMALS.

The tubercle bacilli isolated from the great majority of the cases of human tuberculosis investigated by the Commission and reported upon in the 2nd Interim Report fell readily into one or other of two groups.

The bacillus of one group (Group I) was shown to be identical both in respect to its virulence and its cultural characters with the bovine tubercle bacillus and was found in 14 out of the 60 cases examined.

The bacillus of the other group (Group II) occurred more frequently and was found in 45 out of 60 cases examined ; it differs from those in the preceding group in growing luxuriantly on artificial media and in possessing low virulence for the calf and rabbit. This bacillus was found in all clinical varieties of tuberculosis investigated and in persons of all ages.

The bovine tubercle bacillus on the other hand was obtained almost solely from children and in cases in which the bacilli had entered the body presumably from the alimentary tract. The disease produced by this bacillus varied in severity ; in the majority of the cases it was the cause of the death of the child either from generalisation or from severe local changes ; in the remainder the disease was in the glands of the neck to which it was apparently limited, or the lesions were found in children who had died from other causes. These cases of limited tuberculosis showed that infection with the bovine tubercle bacillus does not always lead at once to a fatal result.

Considering the opportunities which the bovine tubercle bacillus has of entering the human body it is clear that there must be many children who become invaded with this organism and who survive the invasion.

What is the fate of these bacilli ? Since bovine tubercle bacilli are rarely found in the tuberculous lesions of adults, they must under the influences of the human tissues be eventually killed or changed into bacilli with the properties of the common human tubercle bacillus.

There is no doubt that cases of infection with the bovine tubercle bacillus may end in complete recovery ; for proof of this see the summary of the results of the experiments with Virus H. 28. "C.L." on pages 108 and 109 of this volume. Whether bovine bacilli are likely to undergo modification in human tissues is a more difficult problem. There are two ways in which this problem can be attacked ; (1) by the investigation of a large number of different strains of tubercle bacilli from human tuberculous lesions with a view to ascertaining whether there exist types of bacilli intermediate between the human and the bovine (for the results of this investigation see the Report on lupus viruses and the summary on page 13 of this volume) ; and (2) by the passage of various strains of tubercle bacilli through different species of animals to determine whether the properties (*i.e.*, cultural characters and virulence) of the bacilli are stable or are capable of being altered.

This report gives an account of the attempts made to change the human tubercle bacillus into the bovine tubercle bacillus by passage through the bodies of bovines. It gives in addition the results of passage experiments through the rabbit and rat and of the investigation of cultures recovered from various species of animals after a single residence of long duration.

The experiments are grouped together according to the species of animal used. The experiments with calves are the most numerous and the most important and are described first.

The Passage Experiments.—Six strains of tubercle bacilli with the properties of the human tubercle bacillus have been passed each through one or more series of calves in succession.

In three of the six experiments the virus was inoculated in the beginning into two calves, from each of which the virus was continued through a separate series of animals ; in other instances the virus after passing through a single line of calves was sent towards the end of the experiment through a double series.

In two of the six experiments the passage was begun with emulsions of human tuberculous tissues, in three with culture, and in one with culture for two series and tissue emulsion for a third. In each case the passage was continued with emulsions of tuberculous tissues taken from the preceding calf, or from guinea-pigs inoculated with the calf lesions.

Experience here has shown that when a virus containing human tubercle bacilli only is passed every three or four months from one calf to another in emulsions of tuberculous tissues from the preceding animal, the bacilli gradually die out and the experiment cannot be carried further than the third calf on account of lack of tuberculous material and paucity of bacilli. In these circumstances, if the passage is to be continued, resort must be had to some method of increasing the numbers of the bacilli. This increase can be secured by isolating a culture or by passing the virus through the body of a susceptible animal such as the guinea-pig in which the bacilli are able to multiply rapidly. Of the two methods I chose the second, because it seemed to me that continuous contact with animal tissues would be more likely to preserve slight variations in the direction of increased virulence than if the bacilli were made to live a saprophytic existence between the passage animals.

All the guinea-pigs used were young animals bred on the quarantine side of the farm, well removed from all sources of infection. The calves were Jerseys from one and a half to six months old, and had not reacted to the tuberculin test.

Special precautions have been taken to guard against the introduction into the passage animals of virulent bacilli from other experimental animals. All the animals in connection with two of the most prolonged and extensive experiments (with Viruses H. 80. "D.M." and H. 81. "P.W.") had a special attendant and lived in sheds, situated on a distant part of the farm, which had never been used for animals infected with virulent bacilli, and the animals in the other experiments, though living on the experimental side of the farm were carefully isolated from other infected animals.

In the case of each virus the virulence of the culture isolated from the original material was tested on a calf or calves and on rabbits, and the cultural characters on artificial media were determined. In those cases in which the experiment began with emulsions of tuberculous tissues, rabbits as well as calves were inoculated to test the virulence of the material used.

The plan of investigation was the same in each experiment ; a culture was isolated from every calf and tested on artificial media to see whether there had been any change in the cultural characters of the bacillus ; occasionally these cultures were tested on rabbits, but the majority were held in reserve to act as controls should the results in the succeeding calves point to an increase of virulence ; whenever a calf was inoculated one or two rabbits were inoculated at the same time with some of the same material. [In the following abstracts the results of these inoculations into rabbits are not always referred to ; they were in every case in agreement with the results in the calves.]

The guinea-pigs used to increase the numbers of the bacilli were all inoculated intraperitoneally. Tuberculous tissues used in the preparation of the emulsions were removed from the animal body with sterilised instruments after thoroughly cauterising the surface of the skin.

The culture from the last calf in the series was tested on artificial media and on calves as well as on rabbits, and its properties compared with those of the original culture. The majority of the calves were inoculated subcutaneously, a few were inoculated intravenously; in one of the series which included seven calves, three of the calves in succession were inoculated intravenously.

One strain of the human tubercle bacillus has been passed through a single series of rabbits and another through a single series of rats. In each case the virus was passed from animal to animal in tissue emulsions. The human tubercle bacillus is more virulent for the rabbit than it is for the calf, and is able to produce in this animal a slowly progressing tuberculosis. The body of the rabbit ought therefore to be a medium more favourable to modification of this bacillus than that of the calf. The rat was used in order to test the effect of the tissues of a very refractory animal on the characters of the human tubercle bacillus. The rat is insusceptible to the subcutaneous inoculation of either human or bovine tubercle bacilli, but when a large dose is inoculated intraperitoneally succumbs, frequently after long periods, as a result of the multiplication of the bacilli in the tissues. The intraperitoneal method of inoculation was therefore used in this experiment.

All the experiments dealt with in the first part of the Report are tabulated on page 58 and summarized on pages 66–73. The charts giving the details of the experiments and the full post-mortem notes of the calves will be found, with the other inoculation experiments with each virus, at the end of this volume.

SUMMARY OF PASSAGE EXPERIMENTS.

Six strains of tubercle bacilli with the cultural characters of the common human tubercle bacillus (Group II) have been passed through one or more series of calves in succession.

The experiments were begun in three cases with culture, in two with emulsions of tuberculous human tissues, and in a third with culture and emulsion. The passages were continued with emulsions made from the tuberculous tissues of the calf immediately preceding, or from the tissues of guinea-pigs through which the virus was passed in order to increase the numbers of tubercle bacilli.

The number of calves in a series varied from two to seven, and the total duration of residence in the bovine tissues varied from 247 to 512 days.

A culture was obtained from the last calf in each series, and its properties compared with those of the culture obtained from the original material. In no case was there any alteration in the cultural characters of the bacillus or in its virulence for the calf and rabbit.

After a residence of one year and four months in the body of the rabbit (three rabbits) the culture from the original material of Virus H 70. "N.W." (Group II) was unchanged in cultural characters and in virulence for the rabbit.

After a residence of 4 years 154 days in the body of the rat (8 rats), the culture derived from the original material of Virus H 16. "J.H." (Group II) was unchanged in cultural characters and in virulence for the calf and rabbit.

A number of observations have been made on the effect of a single long residence of the human tubercle bacillus (Group II) in different species of animals (*see* pages 72–73). The animals included a cow (duration of residence 529 days), a pig (378 days), a rabbit (725 days), a guinea-pig (320 days), a dog (413 days), and a rat (454 days).

In the case of the cow, cultures identical with the culture inoculated were recovered from the prescapular gland, the lung and suprarenal body, and on several occasions from the milk; but from a tuberculous lesion in the long mediastinal gland, considered to be of spontaneous origin, a culture of bovine tubercle bacilli was obtained.

The culture recovered from each of the other animals was identical with the culture inoculated.

TABULAR SUMMARY OF PASSAGE EXPERIMENTS ON MAMMALS WITH THE HUMAN TUBERCLE BACILLUS.

Designation of Virus.	Species of Animal used.	Number of Animals in the Passage.	Total Duration of Passage.	Duration of Residence in the Body of the Calf, Rat, or Rabbit.	Result of Passage on Cultural Characters and Virulence.
H. 67. "E.P."	Calf	4 Calves	551 days	460 days	No alteration.
H. 68. "R.B."	Calf	5 Calves	573 days	506 days	No alteration.
H. 72. "H.C."	Calf	Passage α : 3 Calves	398 days	327 days	No alteration.
		Passage β : 4 Calves	524 days	453 days	No alteration.
H. 79. "J.N."	Calf	Passage α : 4 Calves	513 days	485 days	No alteration.
		Passage β : 3 Calves	390 days	316 days	No alteration.
		Passage γ : 4 Calves	481 days	418 days	No alteration.
H. 80. "D.M."	Calf	Passage α : 4 Calves	562 days	506 days	No alteration.
		Passage β : 2 Calves	315 days	247 days	No alteration.
		Passage γ : 4 Calves	548 days	478 days	No alteration.
		Passage δ : 2 Calves	561 days	512 days	No alteration.
H. 81 "P.W."	Calf	Passage α : 7 Calves	552 days	497 days	No alteration.
		Passage β : 4 Calves	548 days	459 days	No alteration.
		Passage γ : 3 Calves	539 days	452 days	No alteration.
H. 70. "N.W."	Rabbit	3 Rabbits	484 days	484 days	No alteration
H. 16. "J.H."	Rat	8 Rats	1,614 days	1,614 days	No alteration.

TABULAR SUMMARY OF THE OBSERVATIONS ON THE CULTURES RECOVERED AFTER A SINGLE RESIDENCE IN THE BODIES OF VARIOUS SPECIES OF ANIMALS.

The cultures used were of the human type.

Designation of Virus.	Species and Number of Animal used.	Duration of Residence in the Body of the Animal.	Result of Residence on Cultural Characters and Virulence.
H. 83. "G.C."	Cow 61	529 days	No alteration.
H 68. "R.B."	Pig 81	378 days	No alteration.
H. 80. "D.M."	Rabbit 1258	725 days	No alteration.
H. 81. "P.W."	Guinea-pig 2451	320 days	No alteration.
H. 70. "N.W."	Dog 29	413 days	No alteration.
H. 81. "P.W."	Rat 55	454 days	No alteration.

PART II.

MODIFICATION EXPERIMENTS WITH VARIOUS TYPES OF HUMAN TUBERCLE BACILLI IN THE BODIES OF FOWLS AND PIGEONS.

Introduction.

Natural tuberculosis in fowls is caused by a bacillus which differs in many respects from bacilli which are the cause of mammalian tuberculosis.

The following experiments have been made to ascertain whether any of the properties characteristic of the avian tubercle bacillus can be acquired by mammalian tubercle bacilli by residence in the bodies of fowls and pigeons.

The tubercle bacilli used in these experiments have all been obtained from human tuberculous lesions and include representatives of Group II and several of the types, obtained from cases of lupus, which belong strictly neither to Group I nor Group II.

Two methods have been adopted of exposing the bacilli to the influences of the bodies of the fowls and pigeons ; in one the bacilli were put into direct contact with the tissues by inoculation, in the other they were protected from the tissue cells by being enclosed within collodion capsules with the object of subjecting them to the action of the tissue fluids only.

Inoculation Experiments into the Tissues (Fowls only).

Fowls have been inoculated with cultures with the double object of testing their susceptibility to various kinds of human tubercle bacilli and of ascertaining whether residence in the body of the fowl will produce any alteration in the cultural characters and virulence of mammalian tubercle bacilli.

Cultures have been recovered from eight inoculated fowls, in six instances direct from the tissues of the fowl and in two after passage through the guinea-pig, and tested as to their cultural characters.

The virulence of bacilli from three of these fowls as well as from three others from which cultures were not isolated, has been tested by the inoculation of emulsions of the tissues into guinea-pigs (4 cases) or rabbits.

The cultures used to inoculate the fowls were obtained in one case from a tuberculous human lung and in the others from lupus ; nine fowls were inoculated intravenously, one intramuscularly, and one perivenously. Three of the cultures had the characters of a Group II organism, the others grew like bovine tubercle bacilli but had lower virulence than the bovine tubercle bacillus.

The duration of residence in the body of the fowl varied from 28 to 239 days.

All the cultures obtained from the fowls were tested on the differential media and with one exception were found to be identical with the cultures inoculated ; the virulence tests gave similar results.

The exceptional culture was obtained from the spleen of a fowl which had been inoculated intravenously with 10 mg. of a culture derived from lupus (H. 91. "H.S.") and which showed when killed after 239 days early tuberculosis of the intestines, spleen, and liver. This culture exhibited typical avian characters ; the distribution of the disease in the fowl leaves little room for doubt that it was suffering from spontaneous tuberculosis.

In the following table the details of the above experiments are summarised :

Virus.	Number of Fowl.	Method of Inoculation.	Dose.	Duration of Residence.	Effect on Cultural Characters and Virulence.
H. 53. "D.H." (*a*) (*Lupus*)	33	Intramuscular	10·0 mg.	Killed 172 days	Cultural characters unchanged.
H. 85. "H.B." (*Lupus*)	77	Intravenous	10·0 mg.	Killed 146 days	Virulence for guinea-pig unchanged.
H. 91. "H.S." (*Lupus*)	79	"	10·0 mg.	Killed 239 days	" " "
	81	"	10·0 mg.	Killed 239 days	Avian bacillus isolated.

Virus.	Number of Fowl.	Method of Inoculation.	Dose.	Duration of Residence.	Effect on Cultural Characters and Virulence.
H. 92. "D.N." (*Lupus*)	89	Intravenous	50·0 mg.	Killed 206 days	Culture unchanged in characters and virulence for guinea-pig.
H. 106. "K.R." (*Lupus*)	105	,,	50·0 mg.	Killed 129 days	Cultural characters unchanged.
	103	,,	10·0 mg.	Died 45 days	,, ,, ,,
H. 107. "H.H." (*Lupus*)	141	,,	10·0 mg.	Died 32 days	Virulence for rabbit unchanged.
H. 108. "H.R." (*Lupus*)	109	,,	10·0 mg	Died 28 days	Cultural characters unchanged.
	107	Perivenous	1·0 mg.	Killed 126 days	,, ,, ,,
H. 81. "P.W." (*Tuberculosis of the lungs*)	67	Intravenous	50·0 mg.	Killed 183 days	Cultural characters and virulence for guinea-pig unchanged.

In three cases the virus was passed into a second fowl, twice in the form of a culture recovered from the first fowl and once in an emulsion of the tissues of the first fowl.

One of the cultures derived from the local lesion of Fowl 33 (Virus H. 53. "D.H." (*a*)) was inoculated intramuscularly into Fowl 61, the growth from two serum tubes being used ; Fowl 61 was killed 135 days later and showed a local lesion only ; with an emulsion made from this local lesion cultures were sown and a guinea-pig and a pigeon inoculated ; another guinea-pig was inoculated with an emulsion of the spleen. All the culture tubes remained sterile and none of the animals developed tuberculosis ; the bacilli were evidently dead.

The other culture was obtained from the pyloric gland of a guinea-pig which had been inoculated with an emulsion of the lung and spleen of Fowl 67 (Virus H. 81. "P.W."), and was inoculated intravenously in a dose of 24 milligrammes into Fowl 125 ; a rabbit was inoculated at the same time with 0·1 milligramme of the same culture. The fowl was killed after 282 days and showed no tuberculosis, and in the rabbit, killed after 170 days, one minute tubercle was found in the lung only.

In the third case (Virus H. 107. "H.H.") the bacilli were passed from the first fowl to the second directly in an emulsion made from the lungs ; the fowl (Fowl 141) had been inoculated intravenously with 10 milligrammes of culture and died of acute tuberculosis in 32 days. The emulsion containing moderately numerous tubercle bacilli was inoculated intramuscularly into Fowl 149 and intravenously into two rabbits ; the fowl showed no tuberculosis when killed after 191 days ; both rabbits developed mammalian tuberculosis, one dying of general tuberculosis in 144 days the other showing slight tuberculosis of lungs and kidneys when killed after 146 days.

In the case of one of the three passage experiments therefore the bacilli taken from the second fowl were shown to be dead and in the other two no tuberculosis was produced in the second fowl.

For the tabular summary of the results of these experiments see pages 259–263.

Collodion Capsule Experiments (Fowls and Pigeons).

In these experiments the tubercle bacilli were first placed in collodion capsules which were then inserted into the peritoneal cavities of fowls or pigeons.

By this procedure the bacilli are afforded protection from the tissue cells and are subjected only to the action of those tissue fluids which permeate the walls of the capsule. The walls of the sacs being impervious not only to cells but also to bacilli, organisms in the tissues around are unable to pass through the walls and contaminate the bacilli within.

The method eliminates therefore the source of error that would result in passage experiments by inoculation from the occurrence in one of the inoculated fowls of an unrecognized infection with the avian tubercle bacillus. The use of capsules has the further advantage that the culture introduced remains localised in a circumscribed area and a greater number of the bacilli can be recovered for investigation than when the bacilli have been disseminated all over the body by inoculation.

Cultures from twelve viruses have been used ; one was a mixture of bovine and human tubercle bacilli, two were attenuated bovine cultures, and the remaining nine were pure cultures of human tubercle bacilli.

Method of preparation of capsules.—The collodion capsules used in the earlier experiments were prepared in the following way:—a glass tube, of diameter varying from 12 to 17 mm. with a rounded extremity was dipped to a depth of three inches into the collodion solution; it was very slowly withdrawn and revolved in the fingers so as to distribute the collodion evenly over the surface; the tube was then put in a vertical position on a peg and the collodion was allowed to dry; a second coat was given in the same way and sometimes a third and a fourth according to the diameter of the glass tube.

When the last coat had thoroughly dried the tube was dropped into methylated spirit and left therein until the collodion had become soft; the collodion tube was then stripped from the glass tube and tied with silk on to a transversely grooved glass collar drawn out fine at one end.

The collodion was allowed to dry on the glass collar and the silk and junction of collodion and glass were painted with fresh collodion; when this was dry the fine glass tube was plugged with wool and the capsule sterilized.

Capsules made in this way are clear, tough and do not readily collapse, but allow fluids to pass through their walls only very slowly. It was probably partly because of this impermeability that so many of the cultures placed in these capsules were found to be dead after a long residence in the peritoneal cavity.

In order to produce a membrane more permeable to fluids the collodion for the capsules used in the later experiments was not allowed to dry completely on the tubes after they had been dipped into the collodion solution; the tubes as soon as the superficial layer had dried were plunged into methylated spirit, the tube of collodion was then removed and fastened as described above on to a glass collar fitted with a rubber cork or on to a piece of semipressure tubing stoppered with a glass rod.

This kind of capsule was used in all the later experiments; they have thick translucent walls which are very permeable to fluids; they have the disadvantage however of collapsing readily and rupturing frequently.

Method of filling and sealing capsules.—Serum and glycerin-serum cultures only have been used; a thick emulsion of the culture was made with the condensation water of the tube and pipetted into the capsule; broth was then usually added until the capsule was threequarters or almost completely filled; in a few instances instead of broth, bovine serum, glycerin-gelatine, or milk was added. The capsule was sealed in a flame or with a rubber cork or with a glass stopper according to the kind of collar used.

Condition of capsule on removal.—The capsule was almost invariably tightly enclosed in a fibrous capsule. Occasionally it was free in the peritoneal cavity; this occurred twice in pigeons inoculated with hard capsules. The condition of the capsules varied; all the hard capsules except two which had ruptured were in exactly the same state as when introduced; there was never any evidence of multiplication of the bacilli, but in several of those which had been incompletely filled with fluid there was evidence that fluids had passed in.

All the soft capsules were without exception collapsed and contained no fluid; they were often ruptured and sometimes by being bent upon themselves broken into two parts. The interior surface of the collodion was nearly always smooth, shiny, and free from culture; in every case there was a deposit of culture just within that part of the collar which had not been filled with the cork. The ruptured capsules and those in which there was no obvious sign of rupture showed on the outside, filling up the folds of the collodion, or situated on the glass part of the capsule, masses of yellow waxy substance which readily emulsified and which microscopically showed tubercle bacilli, never very numerous, a few disintegrated cells and amorphous débris.

In only one case (Pigeon 31. Virus H. 46. "H.W.") was there any disease of the peritoneum in the neighbourhood of the capsule; this indicates that when rupture takes place the capsule is almost invariably already surrounded by a fibrous sheath which prevents bacilli from being dispersed over the peritoneum.

In the majority of cases of rupture not many bacilli escaped into the space between the fibrous sheath and the collodion capsule, most of the culture being found within the capsule; the yellow material on the outside of the capsule contained disintegrated leucocytes, but there was no evidence of a leucocytic invasion of the interior of the capsule. Even when the capsule ruptures, therefore, the special advantages of the method are not lost.

In the charts the two varieties of capsule are designated respectively hard and soft.

Method of investigation of capsular contents.—The material within the capsule was emulsified and culture tubes were sown in every case ; the medium used was egg which experience has shown can be relied upon to produce colonies if the bacilli inoculated are alive. Whenever there was material on the outside of the capsule this was collected, separately emulsified, and cultures were sown ; the rest of the emulsion was then usually added to the first emulsion. All the recovered cultures were tested on the differential media to see if there had been any change in the cultural characters.

After sowing the cultures what remained of the emulsion was usually inoculated into animals ; sometimes only a guinea-pig was used, but more often a rabbit, a pigeon, and a fowl were also inoculated.

Many of the guinea-pigs inoculated intraperitoneally with these emulsions showed, when killed, softened nodules in the omentum, and no sign of disease elsewhere ; tubercle bacilli were found in smear preparations of the pus from the nodules. Since lesions like these might be produced by the inoculation of small doses of avian tubercle bacilli as well as by dead bacilli, it was important to investigate the bacilli contained in them ; cultures were therefore sown from the pus in many cases, but the tubes always remained sterile.

Several of the fowls inoculated intramuscularly with the emulsions derived from the capsules showed at the post-mortem examination necrosis of the muscles and no sign of disease in the internal organs ; this condition also was shown to be caused by dead bacilli.

For a tabular summary of the results of these experiments *see* pages 63-64.

SUMMARY.

Cultures have been recovered after periods varying from 28 to 206 days from seven fowls inoculated intravenously or intramuscularly with tubercle bacilli of human origin. In each case the cultural characters of the bacillus were unchanged.

In four experiments emulsions of the tissues of fowls which had lived from 146 to 239 days after inoculation with human tubercle bacilli produced tuberculosis in guinea-pigs ; during these periods therefore the bacilli producing the disease had resided in the tissues of the fowls without undergoing any alteration in their virulence for the guinea-pig.

In each of three of the experiments bacilli from one fowl have been inoculated into another ; in one the passage was made directly by a tissue emulsion, in the others a culture intervened. In each case the second fowl failed to develop tuberculosis, two showing no sign of disease, the other a local lesion in which there were no living tubercle bacilli.

In another series of experiments, in order to eliminate natural tuberculosis as a possible source of error, the bacilli were first placed in collodion capsules and then inserted into the peritoneal cavities of fowls and pigeons.

Altogether 41 capsules have been inoculated into fowls and pigeons, and 12 different cultures from human tuberculous lesions have been investigated by this method.

Nine of the strains had a single residence only in the peritoneal cavity*;* three were passed in capsules each through a series of fowls and pigeons in succession, in one case there were four separate series, in the second two series, and in the third one only ; the culture in every instance was artificially cultivated in transit from capsule to capsule. *See* Table on opposite page.

In 23 of the capsules after a residence in the peritoneal cavity varying from 59 to 194 days, no living bacilli were demonstrated. In five instances cultures failed, but the animals inoculated (guinea-pigs and a rabbit) became tuberculous ; the virulence of these bacilli was therefore unaltered ; the duration of residence was from 148 to 269 days.

From the other 13 capsules, representing five viruses, cultures were isolated ; each of these cultures grew on artificial media in precisely the same manner as the original culture. Inoculation tests on guinea-pigs, rabbits, fowls, or pigeons, with material from the capsules from which cultures were obtained, showed also that the bacilli had not undergone any change in virulence.

The total duration of residence in collodion capsules of the viruses investigated varied from 59 to 685 days.

TABULAR SUMMARY OF COLLODION CAPSULE EXPERIMENTS.

Virus.	Nature of Tuberculosis.	Classification of Virus according to Cultural Characters and Virulence.	Number of Passages in Collodion Capsules and Duration of each.					Total Duration of Residence in Collodion Capsules.	Result of passage on cultural characters and virulence of culture.
			1st.	2nd.	3rd.	4th.	5th.		
H 46. "H.W." ...	Tuberculosis of a kneejoint.	Group II.	Pigeon 15 (86 days).	Fowl 55 (143 days).	—	—	—	229 days	The bacilli taken from Fowl 55, 2nd capsule, were apparently dead.
				Pigeon 31 (148 days).	Fowl 101 (187 days).	—	—	421 days	A culture obtained from Pigeon 31, 2nd capsule (234 days), was similar to the original in cultural characters and virulence; the bacilli taken from Fowl 101, 3rd capsule, were apparently dead.
			Pigeon 17 (86 days).	—	—	—	—	86 days	The bacilli taken from Pigeon 17, 1st capsule, were apparently dead.
					Series 1.				
H. 53. "D.H." (*a*)	Lupus	Cultural characters of Group I.; virulence intermediate between Groups I. and II.	Pigeon 1 (101 days).	Fowl 41 (52 days).	Fowl 53 (106 days).	—	—	259 days	A culture obtained from Fowl 41, 2nd capsule (153 days), grew like the original; the bacilli taken from Fowls 53 and 51, 3rd capsules, were apparently dead.
					Fowl 51 (104 days).	—	—		
				Pigeon 19 (*See* Series 2).	—	—	—		
			Pigeon 3 (184 days).	—	—	—	—	184 days	The bacilli taken from Pigeon 3, 1st capsule, were apparently dead.
					Series 2.				
			[Pigeon 1 (101 days).]	Pigeon 19 (62 days).	Pigeon 25 (104 days).	Fowl 73 (224 days).	Fowl 139 (152 days).	643 days	A culture obtained from Fowl 139, 5th capsule, (643 days), grew like the original culture. The bacilli taken from Fowl 71 were apparently dead.
						Fowl 71 (170 days).			
					Series 3.				
			[Pigeon 1 (101 days).]	[Pigeon 19 (62 days).]	Pigeon 27 (104 days).	Pigeon 35 (114 days).	Fowl 99 (194 days). Fowl 97 (105 days).	575 days	Cultures obtained from Pigeon 35, 4th capsule (381 days) resembled the original culture in cultural characters and virulence. The bacilli taken from Fowls 99 and 97, 5th capsules, were apparently dead.
					Series 4.				
			[Pigeon 1 (101 days).]	[Pigeon 19 (62 days)]	Pigeon 33 (141 days).	Pigeon 53 (112 days).	Fowl 115 (269 days). Fowl 117 (126 days).	685 days	The bacilli obtained from Fowl 115, 5th capsule (685 days) were similar in virulence to those with which the experiment started. The bacilli taken from Fowl 117 were apparently dead.
H. 66. "W.C." ...	Tuberculosis of the vertebrae.	Group II.	Pigeon 11 (116 days). Pigeon 13 (116 days).	—	—	—	—	116 days	The bacilli taken from Pigeons 11 and 13 were apparently dead.

Group I. = Bovine Tubercle Bacillus. Group II. = Human Tubercle Bacillus.

TABULAR SUMMARY OF COLLODION CAPSULE EXPERIMENTS—*continued.*

Virus.	Nature of Tuberculosis.	Classification of Virus according to Cultural Characters and Virulence.	Number of Passages in Collodion Capsules and Duration of each.					Total Duration of Residence in Collodion Capsules.	Result of passage on cultural characters and virulence of culture.
			1st.	2nd.	3rd.	4th.	5th.		
H. 67. "E.P." ...	Tuberculosis of bones.	Group II.	Pigeon 7 (130 days). Pigeon 9 (130 days).	—	—	—	—	130 days	The bacilli taken from Pigeons 7 and 9, and Fowl 39, were apparently dead.
			Fowl 39 (59 days).	—	—	—	—	59 days	
H. 68. "R.B." ...	Tuberculosis of the sacrum.	Group II.	Fowl 17 (138 days).	—	—	—	—	138 days	The bacilli taken from Fowls 17 and 18 were apparently dead.
			Fowl 18 (139 days).	—	—	—	—	139 days	
			Fowl 57 (149 days).	—	—	—	—	149 days	A culture isolated from the contents of Fowl 57's capsule—through the guinea-pig—resembled the original culture.
			Pigeon 29 (118 days).	—	—	—	—	118 days	The bacilli taken from Pigeon 29 were apparently dead.
H. 70. "N.W." ...	Primary abdominal tuberculosis.	Group II.	Pigeon 5 (150 days).	—	—	—	—	150 days	The bacilli taken from Pigeon 5 were apparently dead.
H. 71. "L.V." (*a*)	Lupus	Closely resembles Group II.	Fowl 12 (142 days).	—	—	—	—	142 days	The bacilli taken from Fowls 12 and 13 were apparently dead.
			Fowl 13 (116 days).	—	—	—	—	116 days	
H. 78. "O.D." ...	General tuberculosis.	Group II.	Pigeon 49 (246 days).	—	—	—	—	246 days	A few bacilli survived the long residence in the body of the pigeon, and these were unaltered in virulence for the guinea-pig.
H. 81. "P.W." ...	Tuberculosis of lung.	Group II.	Pigeon 21 (103 days).	Fowl 65 (215 days).	—	—	—	318 days	A culture obtained from Pigeon 21, 1st capsule, grew like the original; the bacilli taken from Fowl 65 were apparently dead.
			Pigeon 23 (103 days).	—	—	—	—	103 days	The bacilli taken from Pigeon 23 were apparently dead.
H. 85. "H.B." ...	Lupus	Cultural characters of Group I.; virulence intermediate between Groups I. and II.	Fowl 83 (249 days).	—	—	—	—	249 days	A few bacilli survived the long residence in the body of the fowl, and these were unaltered in virulence for the guinea-pig.
H. 87. "W.D." ...	Tuberculosis of the suprarenal bodies.	Group II.	Fowl 59 (146 days).	—	—	—	—	146 days	The bacilli taken from Fowl 59 were apparently dead.
H. 90. "I.P." ...	Primary abdominal tuberculosis.	Mixture of Groups I. and II.	Pigeon 51 (246 days).	—	—	—	—	246 days	The culture recovered from Pigeon 51's capsule was like the original in cultural characters and virulence.

Group I. = Bovine Tubercle Bacillus. Group II. = Human Tubercle Bacillus.

GENERAL CONCLUSION.

The passage experiments performed since the Second Interim Report lend no support to the view that human tubercle bacilli can be changed into bovine tubercle bacilli by passage through the bodies of calves or other mammals, or that mammalian tubercle bacilli can acquire the characteristic properties of avian tubercle bacilli by residence in the body of the fowl.

DETAILED ACCOUNT OF THE PASSAGE EXPERIMENTS IN THE BODIES OF MAMMALS.

(For full Postmortem Notes of the Calves, see end of Volume.)

PASSAGE EXPERIMENT WITH VIRUS H. 67. "E.P."

The culture with which this experiment was begun was obtained from the pus of a scapular abscess in a girl aged 14 years.

The culture after 108 days artificial cultivation was inoculated subcutaneously into two calves (Calf 1173 and Calf 1169), each receiving 50 milligrammes.

Culture.
(Derived from a scapular abscess.)

Calf 1173.
Subcut.
Dose : 50·0 mg.
Killed after 137 days.
|
Guinea-pigs.
|
Calf 1201.
Subcut.
Killed after 90 days.
|
Guinea-pigs.
|
Calf 1261.
Subcut.
Killed after 117 days.
|
Guinea-pigs.
|
Calf 1329.
Subcut.
Killed after 116 days.
|
Guinea-pig.
|
Culture.
|
Calf 1439.
Subcut.
Dose : 50·0 mg.
Killed after 95 days.

Calf 1169.
Subcut.
Dose : 50·0 mg.
Killed after 90 days.
|
Calf 1143.
Subcut.
Killed after 110 days.

Calf 1169 was killed after 90 days and showed slight retrogressive generalised tuberculosis. An emulsion made from its caseous prescapular gland produced in a calf (Calf 1143) inoculated subcutaneously four gritty caseous tubercles in its prescapular gland only, and in two rabbits also inoculated subcutaneously very slight tuberculosis. The disease in the calf and rabbits being very slight, this branch of the experiment was not continued.

Calf 1173 was killed after 137 days ; in this animal the tuberculosis was limited to the site of inoculation and the adjacent prescapular gland.

The virus from the prescapular gland of this calf was passed through a series of three calves each of which was inoculated subcutaneously with an emulsion made from the tuberculous organs of guinea-pigs infected from the preceding calf.

In the first two of these calves the disease had not extended beyond the adjacent prescapular gland ; the third (Calf 1329) showed besides a local lesion and tuberculous prescapular gland, numerous small retrogressive tubercles in the lungs, three in the liver, one in the heart and scattered calcareous tubercles in many of the lymphatic glands.

A culture was obtained from the lung of this, the last calf, through the guinea-pig and inoculated subcutaneously into a calf (Calf 1439) in a dose of 50 milligrammes and into a series of rabbits, three intravenously and one subcutaneously.

The calf killed 95 days later showed retrogressive tuberculosis limited to the site of inoculation and adjacent prescapular gland ; the tuberculosis produced in the rabbits was also slight and retrogressive.

The culture produced luxuriant growths on artificial media and in this respect also resembled the culture with which the experiment began.

After a residence of 460 days in the body of the calf therefore the culture from the original material of Virus H. 67. E.P. showed no alteration in cultural characters or in virulence for the calf and rabbit.

PASSAGE EXPERIMENT WITH VIRUS H. 68. "R.B."

This experiment was begun with culture obtained directly from the original material of Virus H. 68. R.B., pus from a sacral abscess in a man aged 69.

Culture.
(Derived from a sacral abscess.)
|
Calf 1167. Subcut.
Dose : 50·0 mg.
Killed after 92 days.
|
Guinea-pigs.
|
Calf 1187. Subcut.
Killed after 91 days.
|
Guinea-pigs.
|
Calf 1251. Subcut.
Killed after 95 days.
|
Calf 1293. Subcut.
Killed after 116 days
|
Guinea-pigs.
|
Calf 1361. Subcut.
Killed after 112 days.
|
Culture.
|
Calf 1463. Subcut.
Dose : 68·0 mg.
Killed after 96 days.

The culture was isolated and maintained on glycerin-serum and had been 190 days in artificial cultivation when inoculated into the first calf of the series (Calf 1167).

The passage was continued with tissue emulsions, four calves in series being inoculated subsequent to the one inoculated with culture.

On account of the small amount of tuberculous material available in the calves, the virus from the first, second and fourth calves in the series was passed through the bodies of guinea-pigs in order to increase the number of tubercle bacilli.

The five calves were killed in good health in periods varying from 91 to 116 days ; in two the tuberculosis was limited to the site of inoculation and nearest glands and in the other three there were besides the local tuberculosis a few minute calcareous tubercles in the internal organs and glands.

The culture isolated from the prepectoral gland of the last calf of the series was tested on artificial media and on a calf and two rabbits.

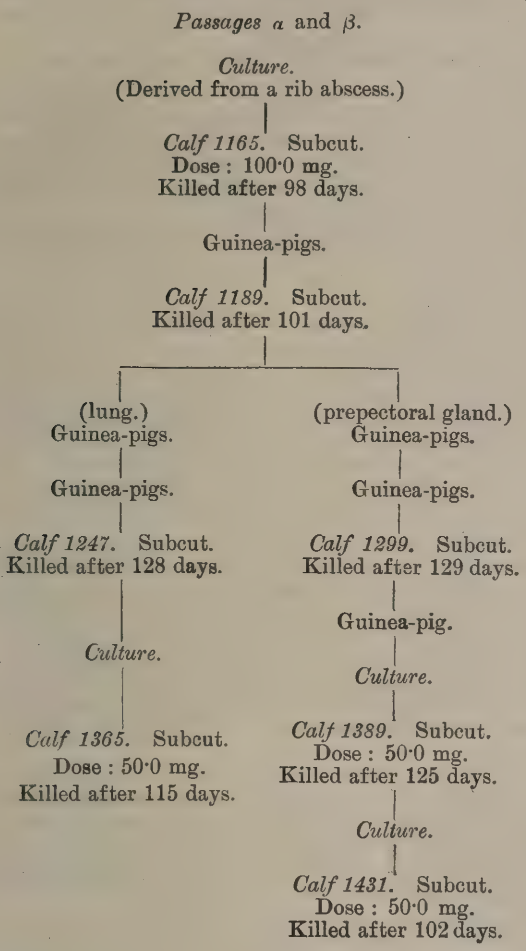
The culture grew luxuriantly and exhibited low virulence for the calf and rabbits.

After a residence of 506 days in the body of the calf therefore the culture showed no change in cultural characters or in virulence for the calf and rabbit.

PASSAGE EXPERIMENT WITH VIRUS H. 72. "H.C."

The first calf of this series was inoculated with culture obtained from the pus of a rib abscess in a man aged 49 years.

When inoculated the culture had been 2½ months in artificial cultivation.



The calf (Calf 1165) received a dose of 100 milligrammes subcutaneously and was killed 98 days later; the tuberculosis produced was limited to the site of inoculation and the adjacent lymphatic gland which contained two fibro-calcareo-caseous nodules.

These nodules were emulsified and inoculated into two guinea-pigs; the guinea-pigs were killed after 21 days and their tuberculous lesions made into an emulsion which was inoculated subcutaneously into a calf and a rabbit.

The calf (Calf 1189) received 267 million tubercle bacilli and was killed in good health 101 days later; the post-mortem examination showed a fibro-caseous local lesion, tuberculosis of the nearest glands, a small number of fibro-caseous nodules in the lungs and two nodules in a kidney.

The passage was continued from this calf along two separate lines, beginning in one case with the lung and in the other with the prepectoral gland.

In each case the bacilli were first passed through two series of guinea-pigs and then inoculated subcutaneously into a calf. Both calves developed very large lesions and glands and for some time were unwell; they however recovered and the local swellings diminished in size.

They were killed after 128 days (Calf 1247) and 129 days (Calf 1299) and each showed slight generalised but obviously retrogressive tuberculosis.

A culture was obtained from each calf, in one case from a precrural gland, in the other from a bronchial gland through a guinea-pig, and inoculated subcutaneously into a calf in a dose of 50 milligrammes, and also into rabbits.

Both calves (Calf 1365 and Calf 1389) showed when killed after 115 and 125 days respectively disseminated retrogressive tuberculosis, the lesions in the calf representing the lung strain (Calf 1365) being unusually widespread.

The rabbits inoculated with these strains of culture at the same time as the calves showed chronic tuberculosis of a type not unusual with viruses of Group II.

Cultures isolated from a portal gland and a suprarenal body of the latter calf (1365) resembled the original culture in their manner of growth on artificial media.

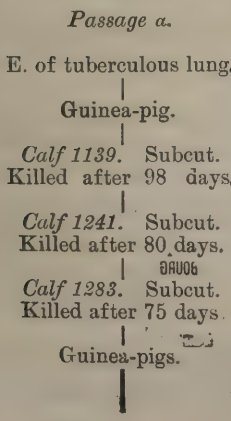
A culture derived from the popliteal gland of the calf representing the prepectoral gland strain of Calf 1189 (Calf 1389) was inoculated subcutaneously into a calf (Calf 1431) and a rabbit. The calf which received 50 milligrammes showed after 102 days slight disseminated retrogressive tuberculosis; the rabbit was killed after 151 days and showed also slight retrogressive tuberculosis.

There was therefore no alteration in the cultural characters or the virulence of the virus after residences of 327 and 453 days in the body of the calf.

PASSAGE EXPERIMENT WITH VIRUS H. 79. "J.N."

The original material of this experiment was the lung of a man aged 24 who died from multiple strictures of the small intestines; the lung was fibroid and contained scattered caseous nodules and fibrous tubercles; there was no tuberculosis elsewhere.

With this virus three separate passage experiments were carried out.



One began with a guinea-pig which had been inoculated with the original material, the other two with cultures obtained direct from the human lung.

The guinea-pig was killed 52 days after an intramuscular inoculation and an emulsion was made from its tuberculous organs.

The emulsion was inoculated subcutaneously into a calf (Calf 1139) and intraperitoneally into a rabbit; the rabbit killed 93 days later had chronic general tuberculosis.

The virus from the calf was passed subcutaneously through two more calves in succession, the duration of life of the three animals varying from 75 to 98 days. With the exception of the second calf (Calf 1241) which showed a few minute foci internally, the tuberculosis in the three calves was limited to the seat of inoculation and nearest glands. The disease in the third calf was very slight, the prescapular gland containing only a few small tubercles.

An emulsion of these tubercles was inoculated into three guinea-pigs and their tuberculous organs used to inoculate a calf intravenously and intramuscularly.

Calf 1321. Intrav. and Intramusc.
Killed after 232 days.
Culture.
Calf 1487. Subcut.
Dose : 100·0 mg.
Killed after 95 days.

The calf (Calf 1321) was killed 232 days later and showed slight generalised retrogressive tuberculosis.

A culture raised from the portal gland of Calf 1321 grew luxuriantly and produced in a calf (Calf 1487) in a dose of 100 milligrammes a local lesion, tuberculosis of the prescapular gland and one tubercle in the lung, and in a rabbit inoculated subcutaneously with 10 milligrammes local tuberculosis and tuberculosis of lungs and kidneys of the type usual with viruses of Group II.

There was thus no alteration in the cultural characters or the virulence of the virus after a residence in the calf's body of 485 days.

The second and third passages began with culture obtained from one of the caseous nodules in the lung of the man. The culture was inoculated intraperitoneally into a dog (Dog 31) in a dose of 50 milligrammes; the dog died of general tuberculosis in 31 days. The culture was passed through the body of the dog in order to obtain a tissue emulsion rich in bacilli; the tuberculous lesions of dogs which have died of acute tuberculosis after intraperitoneal inoculation invariably contain enormous numbers of tubercle bacilli.

Passage β.

Culture
(derived from the tuberculous lung).
Dog 31. Intrap.
Dose : 50·0 mg.
Died in 31 days.
(E. of omentum.)
Calf 1227. Subcut.
Killed after 91 days.
Calf 1259. Subcut.
Killed after 84 days.
Guinea-pigs.
Guinea-pigs. *Calf 1297.* Subcut.
Killed after 156 days.
Calf 1305. Subcut.
Killed after 141 days.
Guinea-pig.
Culture.
Calf 1433. Subcut.
Dose : 82·0 mg.
Killed after 98 days.

One emulsion was made from the omentum and another from the spleen of the dog, and each was inoculated subcutaneously into a calf; both emulsions were very rich in tubercle bacilli.

From each of the calves (Calf 1227 and Calf 1243) the passage was continued separately.

Calf 1227 was killed after 91 days, and an emulsion made from the prescapular gland was inoculated subcutaneously into Calf 1259, which was killed 84 days later. Both calves showed slight general retrogressive tuberculosis.

From the tuberculous organs of the latter calf two emulsions were made, one from the prescapular gland the other from the thoracic glands, and inoculated into guinea-pigs.

The virus from the prescapular gland was passed through one series of guinea-pigs and then inoculated into Calf 1297, which after 156 days showed tuberculosis limited to the site of inoculation and nearest glands.

The bacilli from the thoracic glands of Calf 1259 were passed through two series of guinea-pigs and then inoculated subcutaneously into a calf (Calf 1305); this calf after 141 days showed a local lesion, tuberculosis of the nearest glands, and calcareous foci in the thoracic glands.

A culture was obtained from the thoracic glands of Calf 1305 through a guinea-pig, and inoculated subcutaneously in a dose of 82 milligrammes into a calf (Calf 1433), and into two rabbits (doses 50 and 10 milligrammes).

The calf was killed 98 days after inoculation, and showed tuberculosis limited to the site of inoculation and nearest glands.

One rabbit (10 mg.) died in 93 days and showed a local lesion, many caseating nodules in the lungs chiefly under the pleura, and slight tuberculosis of the kidneys; the other (50 mg.) was killed after 175 days and had a local lesion, slight tuberculosis of the kidneys, and tuberculosis of the lungs rather more severe than usually follows the subcutaneous inoculation of a Group II. culture. Seven weeks previously two rabbits had been inoculated subcutaneously each with one serum culture; they were killed after 174 days; one showed severe pseudo-tuberculosis, the other slight generalised tuberculosis; from the lung of the latter a culture was isolated which grew like the original.

Passage γ.

Dog 31.
(*See preceding table.*)
(E. of spleen).
Calf 1243. Subcut.
Killed after 38 days.
Calf 1225. Subcut.
Killed after 83 days.
Calf 1277. Subcut.
Killed after 98 days.
Guinea-pigs.
Calf 1325. Subcut. and Intrav.
Killed after 199 days.
Guinea-pig.
Culture.
Calf 1479. Subcut.
Dose : 100·0 mg.
Killed after 116 days.

The emulsion made from the spleen of Dog 31 was inoculated subcutaneously into Calf 1243. A very large lesion developed which softened and broke down and the animal was unwell; it was killed 38 days after inoculation on account of the profuse discharge from the lesion. At the post-mortem examination the animal was found to have early general tuberculosis.

The virus from the prescapular gland of this calf was passed through two calves in series, both of which when killed showed slight retrogressive tuberculosis, then into guinea-pigs, and finally into Calf 1325 intravenously and subcutaneously.

In the latter after 199 days there was a local abscess, tuberculosis of the nearest glands and slight retrogressive tuberculosis of the lungs and thoracic glands.

A culture was obtained from the left bronchial gland of Calf 1325 through the guinea-pig, and inoculated subcutaneously into Calf 1479 (dose 100·0 mg.) and into two rabbits (dose 10·0 mg. each).

The calf was killed 116 days after inoculation and slight generalised retrogressive tuberculosis was found at the post-mortem examination.

The rabbits were killed after 167 days and each showed local tuberculosis and tuberculosis of lungs and kidneys (slight).

A culture obtained from the prescapular gland of the last passage calf (Calf 1325) grew luxuriantly on artificial media like the original culture.

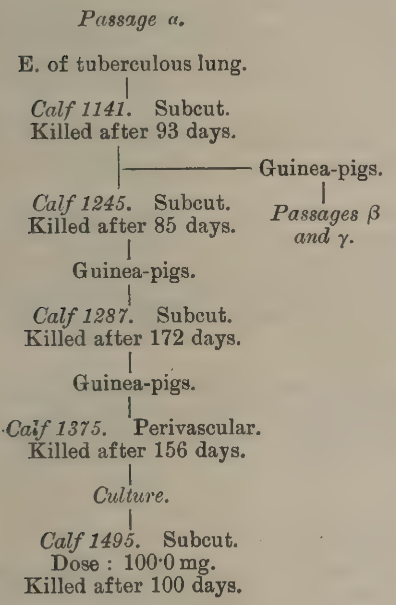
The duration of residence in the body of the calf in the second and third passage experiments was 316 and 418 days respectively.

nary. The bacilli from the lung of a man aged 24 suffering from tuberculo-fibroid phthisis were passed through three separate series of calves, the duration of residence in the calf's body being 316, 418, and 485 days. Cultures isolated from the last calf in each of the three passage experiments were identical with the culture rom the original material in cultural characters and virulence for the calf and rabbits.

PASSAGE EXPERIMENT WITH VIRUS H. 80. "D.M."

The original material of this experiment was the tuberculous lung of a man aged 33; the tuberculosis was confined to the lungs, which were very extensively diseased.

An emulsion was made of portions of the solid caseating areas in the lung, and inoculated subcutaneously into two calves and into a series of four rabbits. The emulsion was estimated by Dr. Eastwood to contain 19½ million tubercle bacilli per cc., and of this emulsion each calf received 10 cc. and each rabbit 1 cc. Three of the rabbits survived the inoculation and when killed after 114 days showed slight retrogressive tuberculosis. From the two calves the virus was passed through four separate series of animals, three proceeding from one calf (Calf 1141) and one from the other (Calf 1131).



Calf 1141 was killed 93 days after inoculation and showed at the post-mortem examination a local lesion, tuberculosis of the nearest glands and a few calcareous foci in some of the abdominal glands. An emulsion was made from its prescapular gland and used to inoculate a calf (Calf 1245) subcutaneously and a series of guinea-pigs intraperitoneally.

The guinea-pigs formed the starting-point of the second and third branches of the experiment (see below).

The virus from Calf 1245 was passed through two more calves—the first was inoculated subcutaneously; in the second the inoculation was perivascular (an attempt to inoculate intravenously having failed)—the bacilli in each case being first increased in numbers by passage through the bodies of guinea-pigs.

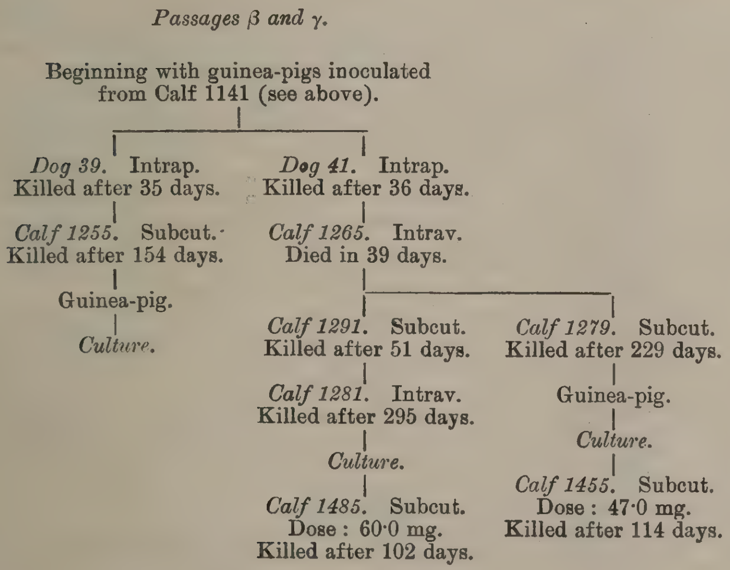
All three calves were killed in good health in periods varying from 85 to 172 days; in one the disease was limited to the site of inoculation and the nearest glands, in the other two besides a local lesion and tuberculosis of the nearest glands there were a few minute retrogressive tubercles in the internal organs and glands.

The duration of residence in the animal body up to this time was 562 days—506 days in the body of the calf (4 calves), and 56 days in the body of the guinea-pig.

A culture was isolated from the cervical gland of the last calf of the series (Calf 1375) and after 68 days artificial cultivation was inoculated subcutaneously into a calf (Calf 1495, dose 100 mg.), and into two rabbits (doses 48 and 10 mg.). The calf was killed 100 days later and showed a local lesion and slight tuberculosis of the nearest glands only; one rabbit died in 106 days of pseudotuberculosis, the other when killed showed local tuberculosis and slight tuberculosis of the lungs and kidneys.

The second and third lines began with the series of guinea-pigs which had been inoculated with the emulsion of the prescapular gland of Calf 1141.

An emulsion made from their tuberculous lesions was inoculated intraperitoneally into two young dogs, each receiving 10 cc.; the emulsion was not very rich in tubercle bacilli.



The dogs were killed 35 and 36 days after inoculation and on post-mortem examination showed tuberculous peritonitis and early general tuberculosis.

An emulsion was made from the tuberculous lesions of each dog and inoculated into a calf and rabbits. The rabbits all inoculated subcutaneously showed when killed in periods varying from 125 to 149 days slight retrogressive tuberculosis only.

The emulsion from Dog 39 was inoculated subcutaneously into Calf 1255; this calf was killed after 154 days and showed a local lesion, two small tubercles in the prescapular gland and one in a suprarenal body; the passage along this line was discontinued at this calf (duration of residence in the body of the calf, 247 days). A culture obtained from its prescapular gland through the guinea-pig was identical in cultural characters with the original.

The emulsion from the other puppy, Dog 41, was inoculated intravenously into Calf 1265; the calf died of general tuberculosis in 39 days and an emulsion made from one of its mediastinal glands was inoculated subcutaneously into two calves; the emulsion contained numerous bacilli.

One calf, Calf 1291, was killed 51 days after inoculation on account of the profuse discharge from the local lesion, and showed disseminated tuberculosis not severe and not apparently progressive.

An emulsion of the prescapular gland was inoculated intravenously into Calf 1281. This calf killed 295 days later had very slight retrogressive tuberculosis.

The total period of residence of the virus in the animal body at this time was 548 days, 478 days in the calf and 70 in the dog and guinea-pig.

A culture was obtained direct from one of the mediastinal glands of Calf 1281 and tested on artificial media, a calf, and two rabbits. It grew luxuriantly and produced slight retrogressive tuberculosis in the calf and rabbits (inoculated subcutaneously).

The other calf inoculated from Calf 1265 (Calf 1279) was killed in good health after 229 days and showed a local lesion and tuberculosis of the nearest glands only. From this calf also cultures were isolated—from the prescapular gland direct and through the guinea-pig; the cultures grew luxuriantly on artificial media and produced slight tuberculosis in a calf and in two rabbits inoculated subcutaneously.

Passage δ.

E. of tuberculous lung.
|
Calf 1131. Subcut.
Killed after 366 days.
|
Guinea-pigs.
|
Guinea-pigs.
|
Calf 1369. Subcut.
Killed after 146 days.
|
Culture.
|
Calf 1475. Subcut.
Dose: 100·0 mg.
Killed after 22 days.

The fourth branch of the experiment began with Calf 1131, which had been inoculated subcutaneously with 10 cc. of the emulsion of the original material.

This calf was allowed to live 366 days to test the effect on the bacilli of a single prolonged residence. The post-mortem examination showed a fibro-caseous lesion, a fibro-caseous nodule in the prescapular gland, a doubtful tubercle in the lung, and no sign of disease elsewhere; an emulsion of a bronchial gland produced tuberculosis in a guinea-pig. The virus from the prescapular gland was passed through two series of guinea-pigs, and then inoculated into a calf and two rabbits subcutaneously; the emulsion used for these animals was rich in tubercle bacilli.

The calf (Calf 1369), when killed 146 days later, was found to have a local lesion and slight tuberculosis of the prescapular gland only. The bacilli up to this point had resided in the tissues of the calf a total period of 512 days.

A culture derived from the prescapular gland of Calf 1369 was inoculated subcutaneously in a dose of 100 milligrammes into a calf (Calf 1475), and in doses of 50 and 10 milligrammes into rabbits. The calf unfortunately developed urethral obstruction and had to be killed 22 days later; local tuberculosis only was found at the post-mortem examination. The two rabbits were killed after 160 days and showed slight generalised and apparently retrogressive tuberculosis.

The bacilli from the lung of a man aged 33 who died of phthisis were passed through four separate series of calves, the duration of life in the calf's body being 506, 247, 478, and 512 days. Cultures isolated from the last calf in each series were identical in cultural characters and virulence with the culture obtained from the original material of the virus.

PASSAGE EXPERIMENT WITH VIRUS H. 81. "P.W."

The original material of this passage experiment was the tuberculous lung of a man aged 33 years who died of phthisis; the lungs were extensively consolidated and contained many large cavities; there were two calcareous nodules in the mesenteric glands which did not produce tuberculosis in guinea-pigs.

An emulsion was made from the solid caseous parts of the lung and inoculated subcutaneously into two calves, Nos. 1129 and 1145. The emulsion was very rich in tubercle bacilli and it was estimated that each calf received about 3035 million bacilli.

The virus from each of these calves was continued separately through a series of calves in succession. Each series will be described separately.

Passage α.

E. of tuberculous lung.
|
Calf 1129. Subcut.
Killed after 108 days.
|
Calf 1239. Subcut.
Killed after 87 days.
|
Calf 1285. Subcut.
Killed after 88 days.
|
Guinea-pig.
|
Guinea-pigs.
|
Calf 1323. Intrav.
Died in 17 days.
|
Calf 1313. Intrav.
Killed (dying) in 29 days.
|
Calf 1359. Intrav.
Died in 48 days.
|
Calf 1399. Subcut.
Killed after 120 days.
|
Culture.
|
Calf 1499. Subcut.
Dose: 200·0 mg.
Killed after 112 days.

In the first series beginning with Calf 1129 the first three calves were inoculated subcutaneously, the second and third being inoculated with tuberculous material from the one immediately preceding. They were killed 108, 87, and 88 days after inoculation respectively, the first and third showing local tuberculosis only, the second a few minute disseminated lesions as well.

In the third calf (Calf 1285) there was not sufficient tuberculous material to continue the passage directly into another calf the local lesion being small and the prescapular gland apparently normal; an emulsion of this gland, however, produced tuberculosis in a guinea-pig; from this guinea-pig three others were inoculated, and from them an emulsion was obtained which was rich in bacilli.

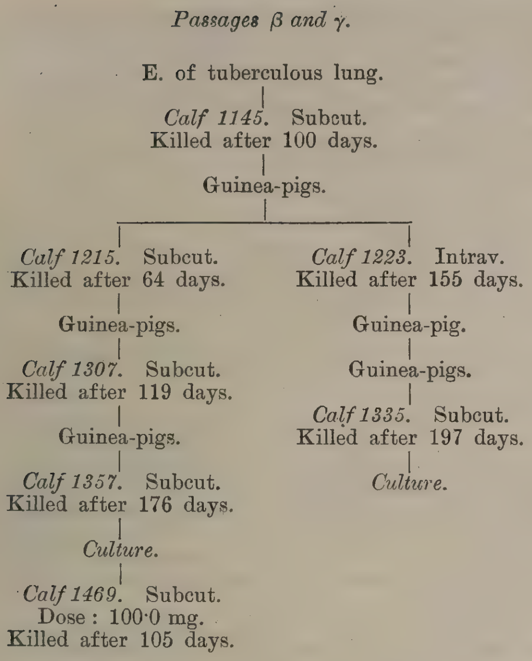
The virus was then passed by intravenous inoculation through a series of three calves in succession; all the calves developed fatal tuberculosis, the duration of life of the animals gradually increasing while the severity of the disease diminished.

The left bronchial gland from the third intravenous animal (Calf 1359) was emulsified and inoculated subcutaneously into a calf which was killed 120 days later; the disease in this animal was very slight and except for a few calcareous grains in the mesenteric glands was limited to the site of inoculation and the nearest gland.

The passage up to this point had lasted 552 days (497 in the body of the calf) and seven calves had been used without apparently effecting any change in the virulence of the bacilli. It was decided therefore to terminate the experiment and to test a culture from the last calf (Calf 1399).

The culture was obtained from its prescapular gland and was inoculated subcutaneously into a calf in a dose of 200 mg. and into two rabbits in a dose of 50 mg. each. The calf was killed 112 days after inoculation and showed tuberculosis limited to the site of inoculation and the nearest glands. The rabbits were killed after 157 days; one showed local tuberculosis, moderately severe tuberculosis of lungs and slight tuberculosis of kidneys, the other a local lesion and one tubercle in a kidney only.

The culture grows luxuriantly on artificial media and in this respect also resembles the culture from the original material.



The first calf (Calf 1145) in the second series was killed 100 days after inoculation; it was found to have generalised tuberculosis not progressive but more severe than is usual after the inoculation of Group II bacilli.

Cultures were isolated from different parts of the body, from the prescapular gland, the mediastinal gland, an ileo-colic gland and an ischiatic gland. All grew luxuriantly like the culture from the original material. The strains from the prescapular and the ischiatic gland were each inoculated subcutaneously into a series of rabbits; these were killed four and a half months later and all showed slight retrogressive tuberculosis.

An emulsion was made from one of the mediastinal glands of the calf and was inoculated into a series of four guinea-pigs.

These were killed after 32 days and their tuberculous organs made into an emulsion. The emulsion was inoculated subcutaneously into one calf (Calf 1215) and intravenously into another (Calf 1223).

Calf 1215 was killed after two months and showed on post-mortem examination very slight disseminated tuberculosis; the virus from this calf was passed through two more calves subcutaneously, a series of guinea-pigs intervening in each case. In these two calves (Calves 1307 and 1357) the tuberculosis was limited to the site of inoculation and the nearest glands.

The bacilli had now resided in the tissues of the calf a total period of 459 days.

A culture was isolated from the last calf (Calf 1357) and tested on artificial media and a calf and two rabbits.

The calf received 100 milligrammes subcutaneously and was killed 105 days later; it showed a local lesion, caseation of the left prescapular gland and no tuberculosis elsewhere. The two rabbits which received 10 milligrammes each subcutaneously were killed after 151 days and showed slight retrogressive tuberculosis.

The culture grew on artificial media exactly like the culture from the original material.

The intravenous calf (Calf 1223) inoculated with the same emulsion as Calf 1215, was killed after 155 days; the lungs contained minute glassy tubercles and there were calcareous patches and foci in the mediastinal glands, an occasional focus in a few other glands and a few in the heart.

The bacilli from the thoracic glands were passed through two series of guinea-pigs and then inoculated subcutaneously into a calf and two rabbits. The calf (Calf 1335) showed after 197 days a small local lesion and a few doubtful foci in the lungs. The rabbits were killed 224 days after inoculation; in each case there was a local lesion and a few minute tubercles in the lungs only.

A culture obtained from the local lesion of Calf 1335 was identical in cultural characters with the culture from the original material; the bacilli had now resided in the tissues of the calf a total period of 452 days.

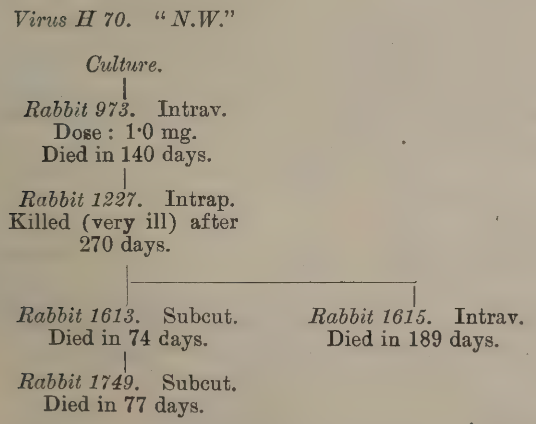
The bacilli from the lung of a man aged 33 who died of phthisis were passed through three separate series of calves, the duration of residence in the calf's body being 497, 459 and 452 days. Cultures isolated from the last calf in each series were identical in cultural characters and virulence with the culture obtained from the original material of the virus.

PASSAGE EXPERIMENT IN THE RABBIT WITH VIRUS H. 70. "N.W."

A culture derived from the original material (mesenteric glands) of Virus H 70. "N.W." through guinea-pig 1928, has been passed through a series of three rabbits in succession.

The virus was obtained from a child aged 10 months who died of general tuberculosis.

The first rabbit (Rabbit 973) received 1 milligramme of the culture intravenously; it died of general tuberculosis in 140 days. An emulsion was made from the lung and inoculated intraperitoneally into Rabbit 1227.



This rabbit was killed when very ill 270 days after inoculation and showed tuberculosis of the omentum, lungs, and kidneys (moderately severe); one testicle also was enlarged and caseous, and the anklejoints and right elbow joint were swollen and filled with caseating substance.

An emulsion of the lung, in which tubercle bacilli were scanty, was inoculated subcutaneously into Rabbit 1613, and an emulsion of caseating material from an anklejoint, containing numerous tubercle bacilli, was inoculated intravenously into Rabbit 1615 and subcutaneously into Rabbit 1614.

Cultures were sown from both these emulsions; they grew luxuriantly on artificial media, resembling the original culture.

Rabbit 1614 died in 11 days of cellulitis; Rabbit 1615 inoculated intravenously with the emulsion made from the anklejoint died in 189 days and showed tuberculosis limited to the lungs and kidneys, apparently insufficient to account for death and of the type usual with viruses of Group II. This branch of the experiment was therefore discontinued.

Rabbit 1613, inoculated subcutaneously with the emulsion of lung of Rabbit 1227 died in 74 days and showed a local lesion, a number of large irregular reddish nodules with central caseous foci in the lungs and a single tubercle in one kidney, and no tuberculosis elsewhere.

The virus had now resided 484 days in the animal body and it was decided to discontinue the experiment. A culture was raised from the lung of the last rabbit (Rabbit 1613) and an emulsion of the lung was inoculated into a rabbit subcutaneously in order to test the virulence of the virus at this point.

The rabbit inoculated subcutaneously with the lung emulsion died of causes other than tuberculosis in 77 days and showed local tuberculosis and a tubercle in one kidney only, and the culture isolated from the lung grew like the original culture.

After a residence, therefore, of one year and four months in the body of the rabbit the cultural characters, and the virulence of the virus for this animal, were unchanged.

PASSAGE EXPERIMENT IN THE RAT WITH VIRUS H. 16. "J.H."

Virus H. 16. "J.H." has been passed through a series of eight rats in succession, the total period of residence being 4 years, 154 days. The experiment was begun in October, 1904, by Cobbett, who inoculated three of the rats, and concluded by me in March, 1909.

The first rat was inoculated intraperitoneally with 100 milligrammes of culture derived (through a guinea-pig) from the synovial membrane of a tuberculous knee-joint in a man aged 38 years.

This rat died in 172 days, and showed consolidation of the lungs which were swarming with tubercle bacilli; an emulsion of its lung, spleen, and one kidney was inoculated intraperitoneally into the second rat; the passage was continued in this way, emulsions of the organs of one rat being used to inoculate the next. All the rats died, the duration of life varying from 35 to 439 days; six showed no visible tuberculous lesions, but tubercle bacilli were numerous in the organs; in the other two the lungs were red and hepatised and mottled with whitish foci, and tubercle bacilli were numerous in smear preparations, other organs being normal to the naked eye and containing few or no bacilli.

Cultures were isolated from the 7th rat, and the 8th, the last rat of the series; both cultures grew on artificial media precisely like the original culture, and the one derived from the 7th rat was shown to be unaltered in virulence for the calf (Calf 1371) and rabbit.

The chart of this passage experiment and the post-mortem notes of Calf 1371 will be found on pages 74–76.

THE OBSERVATIONS ON THE CULTURES RECOVERED AFTER A SINGLE RESIDENCE IN THE BODIES OF VARIOUS SPECIES OF ANIMALS.

(1) ADULT BOVINE.

The bacilli from the virus H. 83. "G.C." after residing in the tissues of a cow 529 days were unchanged in cultural characters and in virulence for rabbits.

The cow (Cow 61) was inoculated intravenously with 150 milligrammes of a culture of the bacilli and was killed 529 days later. On post-mortem examination a few scattered nodules and tubercles either dense and caseous and calcareous or muco-purulent were found in the lungs, the long mediastinal gland contained three fibro-caseous nodules, the pancreas three caseo-purulent nodules, and each suprarenal many small gritty caseous nodules. The udder was atrophied and fibroid and contained caseo-calcareous nodules very numerous in the left fore-quarter. Other organs and glands appeared normal.

This cow was one of the animals inoculated to ascertain whether tubercle bacilli can pass into the milk through the normal mammary tissues; tubercle bacilli were excreted in the milk within 24 hours after inoculation, and persisted in the milk sinuses until her death. Secretion of milk ceased about the ninth week, and the bacilli left in the sinuses underwent great multiplication, for purulent fluid obtained on the 163rd day contained very numerous tubercle bacilli; frequent observations subsequently made showed numerous tubercle bacilli but not in such numbers as when first discovered. The virulence of these bacilli was tested by the inoculation of rabbits with material obtained from the sinuses on the 163rd, 346th, and 528th days after the inoculation of the cow, and also by the inoculation of rabbits with cultures raised from similar material obtained on the 163rd, 276th and 528th days. The bacilli produced in the rabbits the kind of disease usual for bacilli which have low virulence for the bovine, and the cultures grew luxuriantly like the original culture. (*See* Report on the Excretion of Tubercle Bacilli in Milk.)

Cultures were also isolated direct from the tuberculous lesions in the lung, the long mediastinal gland, and a suprarenal body of the cow, and from a guinea-pig which had been inoculated with an emulsion of the apparently normal left prescapular gland. The cultures from the lung, suprarenal body and prescapular gland were identical with the original culture in cultural characters and virulence for the rabbit. The culture from the mediastinal gland was a typical bovine tubercle bacillus both in its cultural characters and in its virulence for the rabbit. (*See* Tabular Summary on page 73.) In view of the facts that bacilli identical with the inoculated bacilli were obtained from so many other parts of the body of the cow it seems improbable that we are dealing in this case with a modification of the human tubercle bacillus.

(2) PIG.

The culture from Virus H. 68. "R.B." recovered from the body of Pig 81 after one year's residence was unchanged in cultural characters.

Pig 81 was fed with 50 milligrammes of the culture derived from the original material, and showed, when killed 378 days later, caseous and calcareous nodules in the glands of the throat and the mesenteric glands and a few disseminated lesions; the culture was recovered from the submaxillary gland. (*See* page 312.)

(3) RABBIT.

During the course of the experimental work cultures have been isolated from a good many rabbits inoculated with the bacillus of Group II. In the great majority of instances these were obtained from animals unusually severely affected and investigated in order to ascertain whether the disease was produced by the bacillus inoculated, and from others to see if a single long residence in the body of the rabbit had produced any alterations in the characters of the bacillus.

It is unnecessary to give in detail the results of these experiments since in no case was there any evidence of modification.

The details of one experiment, however, are given in full because the culture was recovered from a rabbit which had lived an unusually long time after inoculation.

The rabbit (Rabbit 1258) was inoculated subcutaneously with 10 milligrammes of culture derived from the original material of Virus H. 80. "D.M." (tuberculous lung) and was killed in good health 2 years (725 days) afterwards; it showed a few calcareous foci in the glands adjacent to the site of inoculation and no sign of tuberculosis elsewhere; a guinea-pig inoculated with an emulsion of its lung, however, became tuberculous. Cultures were isolated from a scapular gland and the lung in each case through the guinea-pig. Both strains grow in precisely the same way as the original culture and have been shown to be slightly virulent for the rabbit (*see* page 393).

(4) GUINEA-PIG.

One observation has been made on the effect on the human tubercle bacillus of prolonged residence in the body of the guinea-pig.

Guinea-pig 2451 was inoculated intraperitoneally with 0·00001 milligramme of culture from the original material of Virus H. 81. "P.W." (tuberculous lung) and died of general tuberculosis in 320 days. The culture recovered from the liver was identical in cultural characters with the culture inoculated.

(5) DOG.

One observation has been made on the dog.

An adult dog (Dog 29) was inoculated intraperitoneally with 10 milligrammes of culture derived direct from a human lung (Virus H. 70. "N.W.").

The dog was killed when very ill one year and 48 days after inoculation; the post-mortem examination showed local tuberculosis, tuberculous pleurisy and pericarditis (severe), tuberculosis of lungs (not very severe), and of kidneys (slight).

A culture was obtained from the omentum; it grew luxuriantly on artificial media, exactly like the original, and was shown to be slightly virulent for the rabbit (*see* page 325).

(6) RAT.

One observation has been made on the rat.

Rat 55 was inoculated subcutaneously with 10 milligrammes of culture derived from a tuberculous human lung (Virus H. 81. "P.W.").

It died 454 days later. Post-mortem examination showed no macroscopic tuberculous lesions and no apparent cause for death; tubercle bacilli were seen in a smear from the lung, none in a smear from the spleen.

A culture was obtained from the lung; it grew luxuriantly on artificial media exactly like the original culture, and was shown to be only slightly virulent for the rabbit (*see* page 411).

RABBITS INOCULATED WITH CULTURES DERIVED FROM VARIOUS ORGANS AND GLANDS OF COW 61.

Source of Culture.	Date of Inoculation and Age and Generation of Culture Inoculated.	Dose.	Mode of Inoculation.	Number of Rabbit.	Duration of Life.	Result.
Left prescapular gland through G.P. 3717.	Aug. 27, 1909; 4th generation, 10 days old.	0·01 mg.	Intrav.	2430	K. 136 days	Very slight tuberculosis of lungs.
		0·01 mg.	Intrav.	2431	K. 136 „	Tuberculosis of lungs, and of kidneys (slight).
		10·0 mg.	Subcut.	2432	K. 136 „	Local tuberculosis and very slight tuberculosis of lungs.
Long mediastinal gland, direct.	July 23, 1909; 5th generation, 15 days old.	0·1 mg.	Intrav.	2401	D. 21 days	General tuberculosis.
		0·1 mg.	Intrav.	2402	D. 12 „	General miliary tuberculosis.
		0·01 mg.	Intrav.	2399	D. 28 „	General tuberculosis, severe.
		0·01 mg.	Intrav.	2400	D. 37 „	General tuberculosis.
Lung, direct	Aug. 10, 1909; 6th generation, 18 days old.	0·01 mg.	Intrav.	2405	K. 128 days	Slight tuberculosis of lungs and kidneys.
Suprarenal body, direct.	Aug. 20, 1909; 8th generation, 14 days old.	0·01 mg.	Intrav.	2419	K. 120 days	Very slight tuberculosis of lungs.
		0·01 mg.	Intrav.	2420	K. 120 „	

VIRUS H 16. "J.H."

CHART OF RAT PASSAGE EXPERIMENT.

CULTURE.

Strain derived from the original material through G.P. 609.

October 14, 1904.

RAT 28.
Intraperitoneal.
Dose: 100·0 mg.
Died: April 4, 1905.
172 days.

P.M.—No definite tuberculous lesions. Lungs extensively hepatised and swarming with tubercle bacilli. T.B. numerous in abdominal organs.

RABBITS 171, 172, & 173.
All intraperitoneal.
Doses: 1·0 to 10·0 mg.
All killed after 95 days.

P.M.'s.—Slight tuberculosis.

Emulsion of one lung, one kidney, and spleen.

RAT 36.
Intraperitoneal.
Died: August 17, 1905.
135 days.

P.M.—No definite tuberculous lesions. Lungs extensively hepatised and swarming with tubercle bacilli. T.B. numerous in abdominal organs.

Emulsion of caseous collections on peritoneum.

RABBITS 334 & 335.
Intraperitoneal.
Killed after 220 days.

P.M.'s.—Slight tuberculosis.

Emulsion of lung.

RAT 42.
Intraperitoneal.
Died: August 17, 1906.
365 days.

P.M.—No definite tuberculous lesions. Lungs congested and emphysematous. T.B. not so numerous as usual in lungs, scanty in spleen, none in liver and kidney.

Emulsion of spleen.

RAT 47.
Intraperitoneal.
Died: December 17, 1906.
122 days.

P.M.—No visible lesions. T.B. found in spleen and in lungs.

Emulsion of lung.

RABBIT 945.
Intraperitoneal.
Killed after 138 days.

P.M.—Slight tuberculosis.

Emulsion of spleen and lung.

RAT 52.
Intraperitoneal.
Died: January 22, 1907.
35 days.

P.M.—No visible lesions. T.B. fairly numerous in emulsion of lungs and spleen.

Emulsion of lungs and spleen.

RAT 53.
Intraperitoneal.
Died: April 23, 1907.
90 days.

P.M.—No visible lesions. T.B. numerous in an emulsion of lungs and spleen.

(*Continued on next page.*)

(Continued from preceding page.)

Emulsion of lungs and spleen.

RAT 56.

Intraperitoneal.

Died : January 1, 1908.

253 days.

P.M.—No visible lesions. T.B. moderately numerous in emulsion of lungs and spleen.

Emulsion of lungs and spleen.

RAT 60.

Intraperitoneal.

Died : March 16, 1909.

439 days.

P.M.—Tuberculosis of lungs (T.B. very numerous). Abdominal organs normal.

Culture.

Grows luxuriantly like the original culture.

GUINEA-PIG 2859.

Intraperitoneal.

Died in 19 days.

P.M.—Early G.T.

CULTURE.

Derived from Guinea-pig 2859.

Duration of artificial cultivation : 39 days.

FEBRUARY 28, 1908.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1743	Intrav.	1·0 mg.	D. 70 days	T. of lungs and kidneys.
1744	Intrav.	1·0 mg.	D. 37 ,,	Very slight T. of lungs and kidneys. Death from other causes.
1745	Subcut.	50·0 mg.	K. 209 ,,	Local lesion and slight T. of lungs.
1746	Subcut.	50·0 mg.	D. 137 ,,	Local T., moderately severe T. of lungs (affecting mainly the superficial and dorsal portions of the lobes) and slight T. of kidneys.

CALF 1371.

Subcutaneous.

Dose : 100·0 mg.

Killed : May 22, 1908.

84 days.

P.M.—Cyst with caseo-purulent contents at seat of inoculation. The left prescapular gland contained a large caseous gritty mass. A dozen tubercles were found in the lung and one or two in the kidneys. There was a minute focus in one suprarenal, and fairly numerous yellow foci in the Peyers' patches of the small intestine. Several mesenteric, the ileo-colic, one ischiatic, the popliteal and thoracic glands contained caseous or calcareous tubercles.

POST-MORTEM NOTES OF CALF INOCULATED TO TEST THE VIRULENCE OF THE FINAL CULTURE IN THE RAT PASSAGE EXPERIMENT.

CALF 1371. Virus H 16. "J.H."

Subcutaneous inoculation of culture derived from Rat 56 (seventh passage) through Guinea-pig 2859.

Dose—100·0 milligrammes.

Date of Inoculation—February 28, 1908. [Age about 11 weeks.]

Killed when in good health—May 22, 1908. [84 days after inoculation.]

Clinical Notes.

The calf remained well during the experiment.

Temperature.

On the 10th day after inoculation the temperature rose to 40·2° C., and reached a maximum of 41·0° C. on the 18th day; on the 27th day the temperature fell to normal (39·0° C.) and remained approximately normal subsequently.

Tuberculin Test.

May 20, 1908. [82 days after inoculation.] Reacted. Rise of temperature, 2·7° C.

Weights.

	cwt.	qr.	lbs.
February 28, 1908	1	0	9
May 22, 1908	1	1	6

Total gain of weight.—25 lbs.

Average rate of gain per week.—2 lbs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—At the seat of inoculation on the left side of the neck there was a prominent fluctuant tumour measuring 10 by 6 by 4 cm.; on section it was a cyst with caseo-purulent contents and fibrous wall lined internally with granulation tissue.

Left Prescapular Gland.—The left prescapular gland measured 5·5 by 2·8 by 1·8 cm.; between a third and a half of the gland substance was replaced by a dense yellow caseous gritty mass.

Right Prescapular Gland.—The right prescapular gland measured 5 by 2·3 by 1 cm. It was oedematous (recent tuberculin test), otherwise normal.

Prepectoral Glands.—Normal.

Cervical Glands.—One on the left side under the first rib had a small calcareous patch in the cortex; the rest were normal.

Thorax.

Pleura and Heart.—Normal.

Lungs.—Just under the pleura of the right lung eight tubercles were seen and there were six counted under that of the left; they ranged in size up to a millet seed; the larger ones had opaque yellow centres and one of the small grey ones had a calcareous centre. No tubercles were seen on section.

Thoracic Glands.—There were altogether four yellow caseous foci in the bronchial and mediastinal glands.

Abdomen.

Omentum and Peritoneum; Spleen.—Normal.

Liver.—In the substance of the liver there was a moderate number of grey, sometimes yellowish grey foci, two to three millimetres in diameter; in places they occurred in groups; they did not appear to be of a tuberculous nature.

Portal Glands.—Normal.

Kidneys.—On the surface of the left kidney there were about half a dozen grey foci, the largest 1 mm. in diameter; on section two of the larger ones were definite tubercles, and each had a minute caseous centre; most of the others extended through the cortex as fine grey streaks.

In the cortex of the right kidney there were a few grey streaks seen on the surface as grey points.

Suprarenal Bodies.—The right was normal. The left showed in the cortex a minute yellow focus.

Renal Gland.—Normal.

Coeliac Glands.—One the size of a pea was yellow and softened in the centre and had a thick fibrous margin.

Lumbar Glands.—There was a minute yellow point in the cortex of one lumbar gland.

Alimentary Tract.

Tongue, Pharynx, Tonsils; Submaxillary, Retropharyngeal, and Parotideal Glands.—Normal.

Intestines.—In the small intestine all the Peyer's patches contained discrete yellow foci, the largest 1 mm. or a little more in diameter; they were very numerous in the long patch, while the smaller patches contained a moderate number only.

The large intestine was normal.

Mesenteric Glands.—Those at the extremity of the mesentery contained a number of small yellow gritty tubercles; the rest were normal or contained one or two small tubercles.

Ileo-Colic Glands.—The ileo-colic glands contained a moderate number of calcareous tubercles forming small patches.

Testes.—Normal.

Various Lymphatic Glands.

Axillary, Precrural, Gluteal, Pudic.—Normal.

Popliteal.—The left contained five, the right four, yellow caseous and slightly gritty tubercles, the largest a little more than 1 mm. in diameter.

Ischiatic.—One contained a caseous tubercle the size of a millet seed.

Microscopical Examination.

Tubercle from Kidney.—Four tubercle bacilli seen.

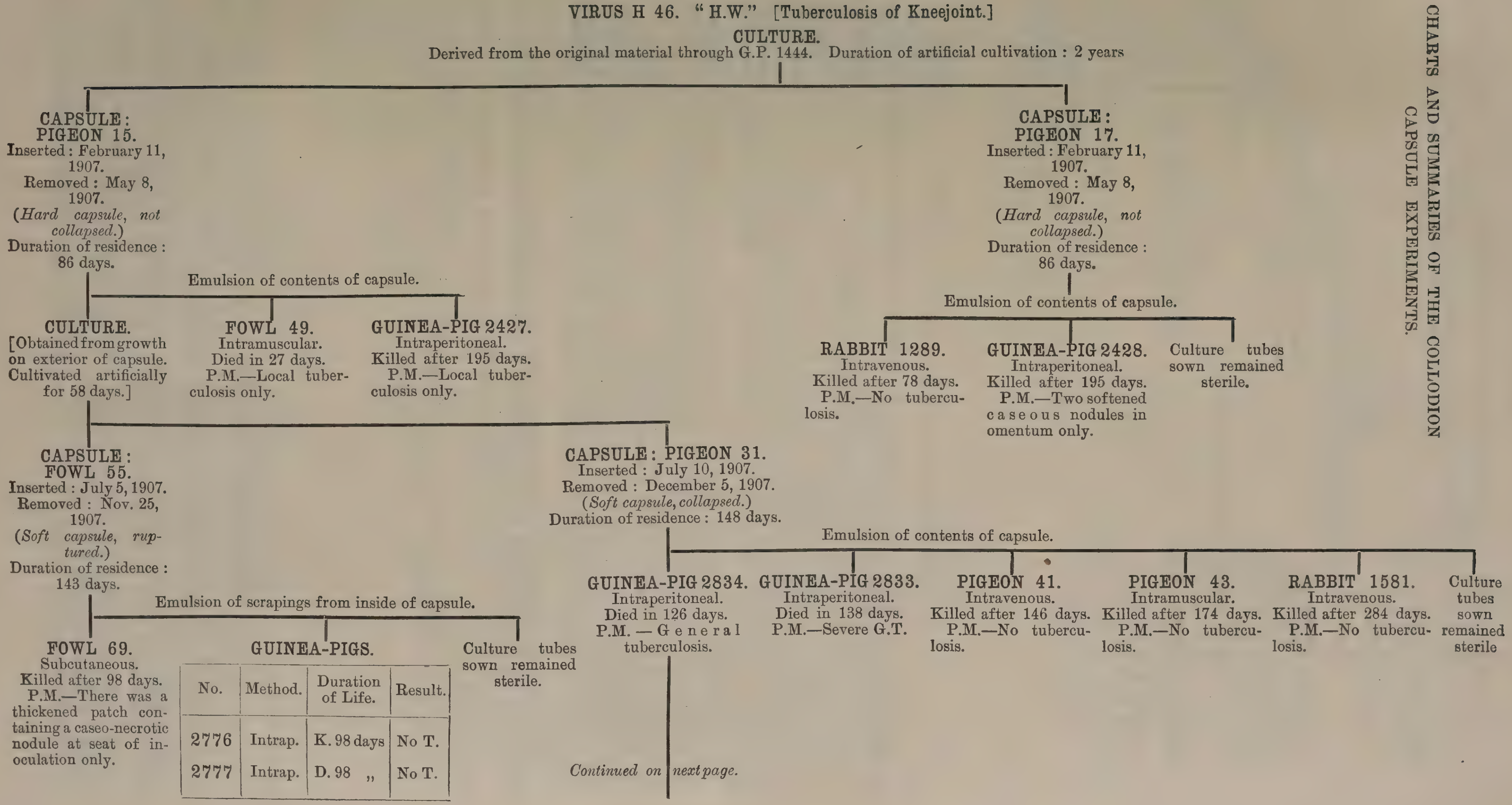
Foci from Liver.—No tubercle bacilli.

Yellow Foci from Small Intestine (two films examined).—No tubercle bacilli.

Smear from Coeliac Gland.—No tubercle bacilli.

Tubercle from Popliteal Gland.—A moderate number of tubercle bacilli seen.

CHARTS AND SUMMARIES OF THE COLLODION CAPSULE EXPERIMENTS.



VIRUS H 46. "H.W." [Tuberculosis of Kneejoint.]

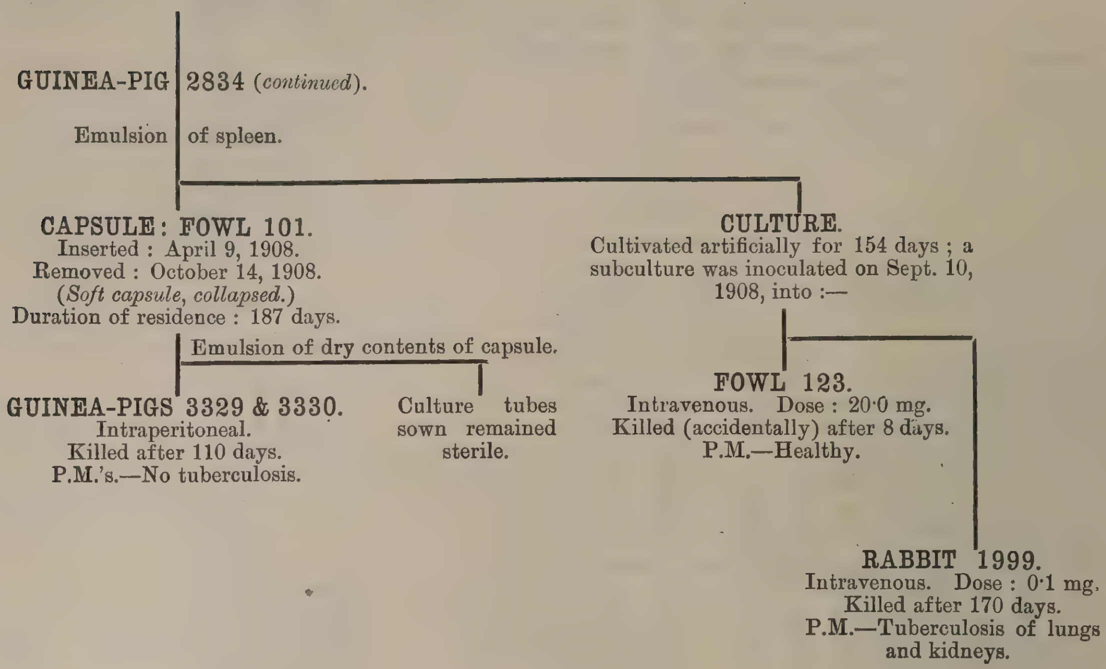
CULTURE.
Derived from the original material through G.P. 1444. Duration of artificial cultivation : 2 years

- **CAPSULE : PIGEON 15.** Inserted : February 11, 1907. Removed : May 8, 1907. (*Hard capsule, not collapsed.*) Duration of residence : 86 days.
  - Emulsion of contents of capsule.
    - **CULTURE.** [Obtained from growth on exterior of capsule. Cultivated artificially for 58 days.]
      - **CAPSULE : FOWL 55.** Inserted : July 5, 1907. Removed : Nov. 25, 1907. (*Soft capsule, ruptured.*) Duration of residence : 143 days.
        - Emulsion of scrapings from inside of capsule.
          - **FOWL 69.** Subcutaneous. Killed after 98 days. P.M.—There was a thickened patch containing a caseo-necrotic nodule at seat of inoculation only.
          - **GUINEA-PIGS.**
          - Culture tubes sown remained sterile.
      - **CAPSULE : PIGEON 31.** Inserted : July 10, 1907. Removed : December 5, 1907. (*Soft capsule, collapsed.*) Duration of residence : 148 days.
        - Emulsion of contents of capsule.
          - **GUINEA-PIG 2834.** Intraperitoneal. Died in 126 days. P.M. — General tuberculosis.
          - **GUINEA-PIG 2833.** Intraperitoneal. Died in 138 days. P.M.—Severe G.T.
          - **PIGEON 41.** Intravenous. Killed after 146 days. P.M.—No tuberculosis.
          - **PIGEON 43.** Intramuscular. Killed after 174 days. P.M.—No tuberculosis.
          - **RABBIT 1581.** Intravenous. Killed after 284 days. P.M.—No tuberculosis.
          - Culture tubes sown remained sterile
    - **FOWL 49.** Intramuscular. Died in 27 days. P.M.—Local tuberculosis only.
    - **GUINEA-PIG 2427.** Intraperitoneal. Killed after 195 days. P.M.—Local tuberculosis only.
- **CAPSULE : PIGEON 17.** Inserted : February 11, 1907. Removed : May 8, 1907. (*Hard capsule, not collapsed.*) Duration of residence : 86 days.
  - Emulsion of contents of capsule.
    - **RABBIT 1289.** Intravenous. Killed after 78 days. P.M.—No tuberculosis.
    - **GUINEA-PIG 2428.** Intraperitoneal. Killed after 195 days. P.M.—Two softened caseous nodules in omentum only.
    - Culture tubes sown remained sterile.

GUINEA-PIGS.

No.	Method.	Duration of Life.	Result.
2776	Intrap.	K. 98 days	No T.
2777	Intrap.	D. 98 ,,	No T.

Continued on next page.



GUINEA-PIG 2834 (*continued*).

Emulsion of spleen.

CAPSULE: FOWL 101.
Inserted : April 9, 1908.
Removed : October 14, 1908.
(*Soft capsule, collapsed.*)
Duration of residence : 187 days.

Emulsion of dry contents of capsule.

GUINEA-PIGS 3329 & 3330.
Intraperitoneal.
Killed after 110 days.
P.M.'s.—No tuberculosis.

Culture tubes sown remained sterile.

CULTURE.
Cultivated artificially for 154 days ; a subculture was inoculated on Sept. 10, 1908, into :—

FOWL 123.
Intravenous. Dose : 20·0 mg.
Killed (accidentally) after 8 days.
P.M.—Healthy.

RABBIT 1999.
Intravenous. Dose : 0·1 mg.
Killed after 170 days.
P.M.—Tuberculosis of lungs and kidneys.

Summary of Experiment with Virus H 46. "H.W."

The culture used was obtained from a tuberculous knee-joint of a man aged 30 ; it exhibited the cultural characters and virulence of the human tubercle bacillus.

A serum culture emulsified in broth was put into each of two collodion capsules ; one capsule was inserted into the peritoneal cavity of Pigeon 15 the other into that of Pigeon 17.

Both capsules were removed 86 days later. The bacilli in the capsule from Pigeon 17 were apparently dead.

On the outside of the capsule from Pigeon 15 there were patches of yellow greasy material which microscopically showed cells, amorphous débris and fairly numerous tubercle bacilli very short and slender resembling serum bacilli ; the capsule was nearly full of very turbid fluid and showed within the glass part a quantity of yellow deposit. The collodion was not ruptured and leakage must have taken place through the imperfectly sealed glass.

Cultures from the contents of the capsule failed, and a guinea-pig and a fowl inoculated did not develop tuberculosis. A culture was however obtained from the material on the outside of the capsule. This after two months artificial cultivation was put into two fresh capsules one of which was inserted into the peritoneal cavity of Fowl 55, the other into that of Pigeon 31. The capsule was removed from the fowl after 143 days and the bacilli within as shown by culture and inoculation tests were found to be dead.

The capsule from Pigeon 31 was collapsed and there was some yellow material on the outside of the collodion and a small quantity of culture within the glass collar. The material from within and from without the capsule was emulsified, cultures were sown and animals inoculated. The egg tubes remained sterile, two pigeons and a rabbit were healthy after periods varying from 146 to 284 days, and two guinea-pigs died of general tuberculosis.

An emulsion of the spleen of one of these guinea-pigs (No. 2384) was put into a collodion capsule which was inserted into the peritoneal cavity of a fowl (Fowl 101). Material taken from this capsule after 187 days residence was sterile (culture and guinea-pig tests).

A culture isolated from the spleen of Guinea-pig 2384 was easy-growing and slightly virulent, resembling the original culture.

After a residence of 234 days in the peritoneal cavities of two pigeons the bacilli therefore had not undergone any change in cultural characters or in virulence.

EXPERIMENT WITH VIRUS H 53. "D.H." (*a*).

In this experiment a culture from a case of lupus in a girl aged 15 years was passed enclosed within collodion capsules through several series of fowls and pigeons in succession.

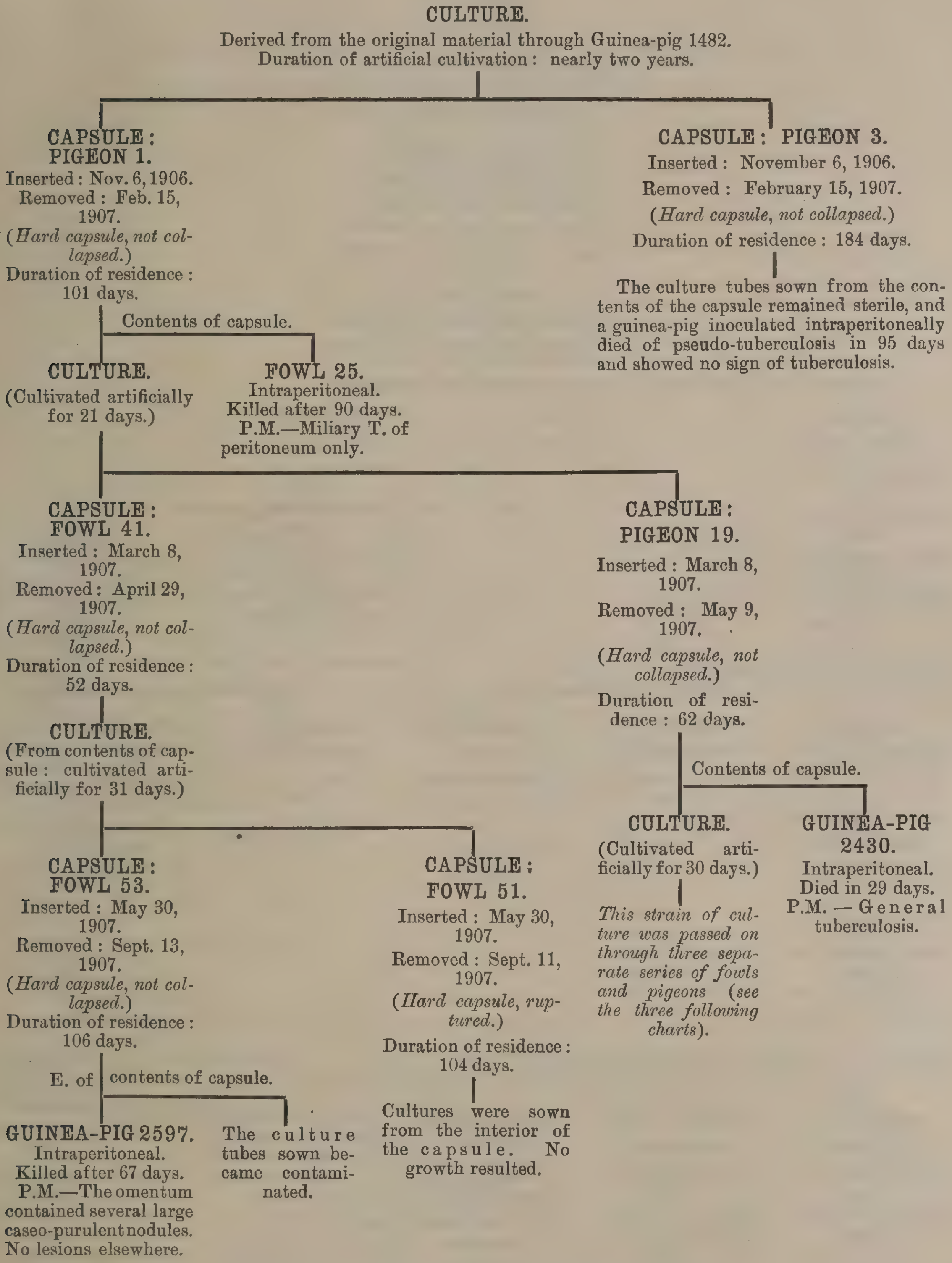
The culture with which the experiment began had been nearly two years in artificial cultivation ; on the differential media it grew like the more easy-growing bovine tubercle bacilli, and its virulence for the calf and rabbit was intermediate between that of the bovine and that of the human tubercle bacillus.

The culture, to begin with, was inoculated into two capsules, each of which was inserted into the peritoneal cavity of a pigeon. A culture was recovered from only one of these, and this was used to inoculate two fresh capsules, which were the starting points of several further branches.

Capsules were introduced altogether into 18 fowls and pigeons, and these, arranged genealogically with the animals inoculated to test the virulence of the contents of the capsules and of the cultures raised from them, form a very complicated chart.

For convenience of reference and of description the chart is presented therefore on four separate sheets, and each group of experiments is described separately.

CHART A.



CULTURE.

Derived from the original material through Guinea-pig 1482.
Duration of artificial cultivation: nearly two years.

CAPSULE: PIGEON 1.
Inserted: Nov. 6, 1906.
Removed: Feb. 15, 1907.
(*Hard capsule, not collapsed.*)
Duration of residence: 101 days.

Contents of capsule.

CULTURE.
(Cultivated artificially for 21 days.)

FOWL 25.
Intraperitoneal.
Killed after 90 days.
P.M.—Miliary T. of peritoneum only.

CAPSULE: FOWL 41.
Inserted: March 8, 1907.
Removed: April 29, 1907.
(*Hard capsule, not collapsed.*)
Duration of residence: 52 days.

CULTURE.
(From contents of capsule: cultivated artificially for 31 days.)

CAPSULE: FOWL 53.
Inserted: May 30, 1907.
Removed: Sept. 13, 1907.
(*Hard capsule, not collapsed.*)
Duration of residence: 106 days.

E. of contents of capsule.

GUINEA-PIG 2597.
Intraperitoneal.
Killed after 67 days.
P.M.—The omentum contained several large caseo-purulent nodules. No lesions elsewhere.

The culture tubes sown became contaminated.

CAPSULE: FOWL 51.
Inserted: May 30, 1907.
Removed: Sept. 11, 1907.
(*Hard capsule, ruptured.*)
Duration of residence: 104 days.

Cultures were sown from the interior of the capsule. No growth resulted.

CAPSULE: PIGEON 19.
Inserted: March 8, 1907.
Removed: May 9, 1907.
(*Hard capsule, not collapsed.*)
Duration of residence: 62 days.

Contents of capsule.

CULTURE.
(Cultivated artificially for 30 days.)

This strain of culture was passed on through three separate series of fowls and pigeons (see the three following charts).

GUINEA-PIG 2430.
Intraperitoneal.
Died in 29 days.
P.M.—General tuberculosis.

CAPSULE: PIGEON 3.
Inserted: November 6, 1906.
Removed: February 15, 1907.
(*Hard capsule, not collapsed.*)
Duration of residence: 184 days.

The culture tubes sown from the contents of the capsule remained sterile, and a guinea-pig inoculated intraperitoneally died of pseudo-tuberculosis in 95 days and showed no sign of tuberculosis.

SUMMARY OF EXPERIMENT ILLUSTRATED BY CHART A.

With the original culture two capsules were filled, one with a broth emulsion of a serum culture, the other with a watery emulsion of two glycerin-serum tubes, each of the 20th generation, 8 days old.

The first was inserted into the peritoneal cavity of Pigeon 1, the other into that of Pigeon 3. The latter was removed 184 days later and the bacilli inside were apparently dead. The other capsule was 101 days in the peritoneal cavity of Pigeon 1, and a culture was recovered from its contents.

This culture was inoculated into two fresh capsules, one of which was inserted into the peritoneal cavity of Fowl 41, the other into that of Pigeon 19.

After 52 days the culture was recovered from the fowl capsule (total duration of residence, 153 days, cultural characters unchanged), and inoculated into two fresh capsules each of which was inserted into the peritoneal cavity of a fowl.

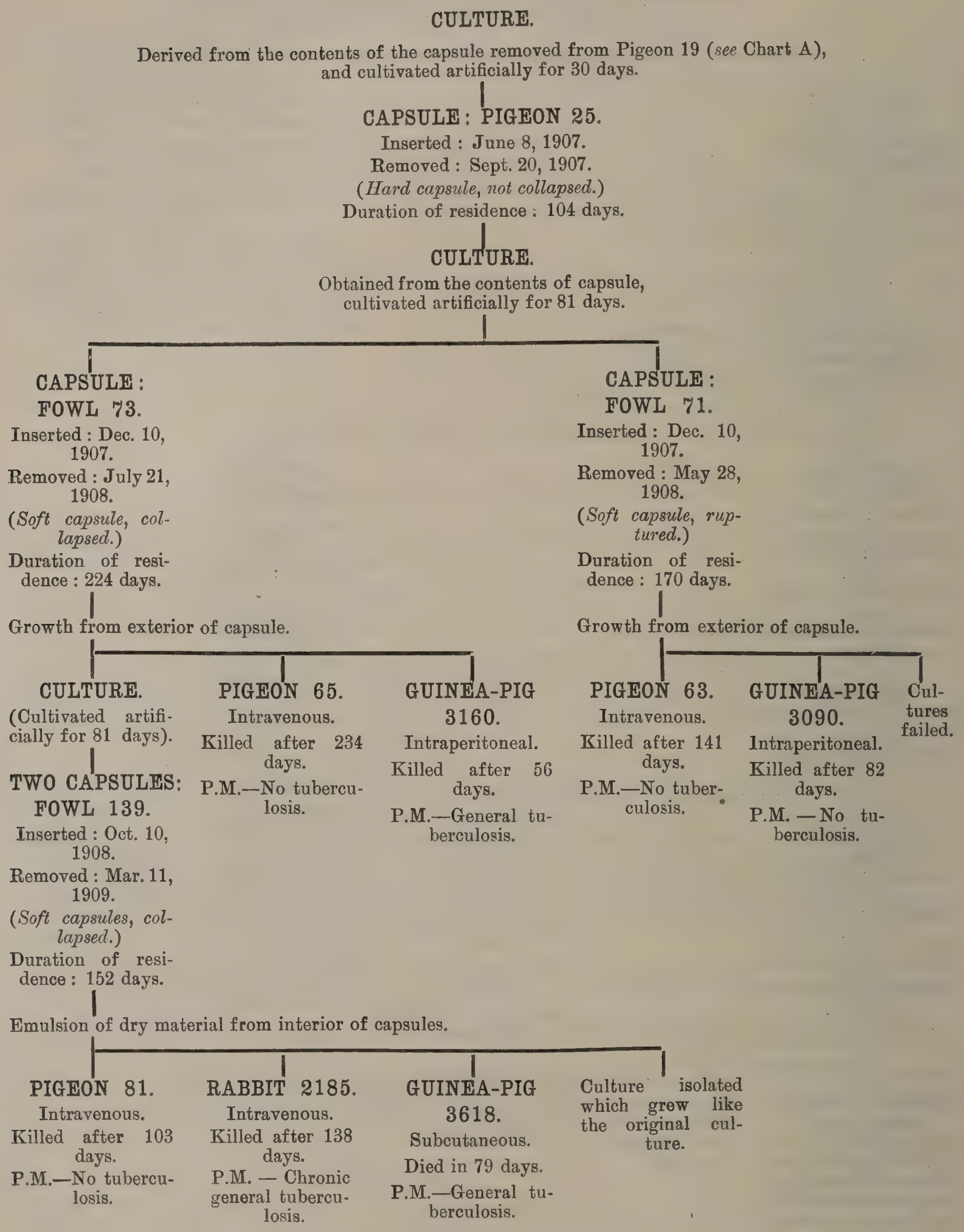
Cultures from the contents of these capsules, after 106 and 104 days residence, failed, and a guinea-pig inoculated from one did not develop tuberculosis; the bacilli in both cases were apparently dead.

A culture was recovered from the capsule of Pigeon 19 and this formed the starting point of the other three branches of the experiment.

VIRUS H 53. "D.H." (*a*)—*continued.*

COLLODION CAPSULE PASSAGE EXPERIMENT—*continued.*

CHART B.



CULTURE.

Derived from the contents of the capsule removed from Pigeon 19 (*see* Chart A), and cultivated artificially for 30 days.

CAPSULE: PIGEON 25.
Inserted: June 8, 1907.
Removed: Sept. 20, 1907.
(*Hard capsule, not collapsed.*)
Duration of residence: 104 days.

CULTURE.

Obtained from the contents of capsule, cultivated artificially for 81 days.

CAPSULE: FOWL 73.
Inserted: Dec. 10, 1907.
Removed: July 21, 1908.
(*Soft capsule, collapsed.*)
Duration of residence: 224 days.

Growth from exterior of capsule.

CULTURE.
(Cultivated artificially for 81 days).

TWO CAPSULES: FOWL 139.
Inserted: Oct. 10, 1908.
Removed: Mar. 11, 1909.
(*Soft capsules, collapsed.*)
Duration of residence: 152 days.

Emulsion of dry material from interior of capsules.

PIGEON 81.
Intravenous.
Killed after 103 days.
P.M.—No tuberculosis.

RABBIT 2185.
Intravenous.
Killed after 138 days.
P.M. — Chronic general tuberculosis.

GUINEA-PIG 3618.
Subcutaneous.
Died in 79 days.
P.M.—General tuberculosis.

Culture isolated which grew like the original culture.

PIGEON 65.
Intravenous.
Killed after 234 days.
P.M.—No tuberculosis.

GUINEA-PIG 3160.
Intraperitoneal.
Killed after 56 days.
P.M.—General tuberculosis.

CAPSULE: FOWL 71.
Inserted: Dec. 10, 1907.
Removed: May 28, 1908.
(*Soft capsule, ruptured.*)
Duration of residence: 170 days.

Growth from exterior of capsule.

PIGEON 63.
Intravenous.
Killed after 141 days.
P.M.—No tuberculosis.

GUINEA-PIG 3090.
Intraperitoneal.
Killed after 82 days.
P.M. — No tuberculosis.

Cultures failed.

SUMMARY OF EXPERIMENT ILLUSTRATED BY CHART B.

Along this branch of the experiment the culture from Pigeon 19 was passed through a pigeon (Pigeon 25) and two fowls (Fowls 73 and 139) in series, the duration of residence being 104, 224, and 152 days respectively; the culture was recovered from each capsule, those from the pigeon and the first fowl being used to inoculate the succeeding capsules. Two capsules were introduced into the last fowl (Fowl 139) and an emulsion of the mixed contents after 152 days residence produced general tuberculosis in a guinea-pig and in a rabbit and no tuberculosis in a pigeon.

All the cultures including the last grew like the original culture.

The total duration of residence of the culture along this branch was 643 days, 267 days in three pigeons, and 376 days in two fowls, and there was not the slightest change in its cultural characters or in its virulence for the test animals.

The culture from the 3rd pigeon (Pigeon 25) had been inoculated in a capsule into Fowl 71 as well as into Fowl 73, but the bacilli recovered from the former after 170 days residence were apparently dead.

VIRUS H 53. "D.H." (*a*)—*continued*.

Collodion Capsule Passage Experiment—*continued*.

CHART C.

CULTURE.

Obtained from the contents of the capsule removed from Pigeon 19 (*see* Chart A) and cultivated artificially for 30 days.

CAPSULE: PIGEON 27.

Inserted: June 8, 1907.

Removed: September 20, 1907.

(*Hard capsule, not collapsed.*)

Duration of residence: 104 days.

CULTURE.

Obtained from the contents of capsule: cultivated artificially for 34 days.

CAPSULE: PIGEON 35.

Inserted: October 24, 1907.

Removed: February 15, 1908.

(*Soft capsule, collapsed.*)

Duration of residence: 114 days.

CULTURE.

Obtained from growth on outside of capsule: cultivated artificially for 49 days.

CAPSULE: FOWL 99.

Inserted: April 4, 1908.

Removed: Oct. 15, 1908.

(*Soft capsule, collapsed.*)

Duration of residence: 194 days.

CULTURE.

Obtained from deposit on inside wall of capsule: cultivated artificially for 49 days.

CAPSULE: FOWL 97.

Inserted: April 4, 1908.

Removed: July 18, 1908.

(*Soft capsule, ruptured.*)

Duration of residence: 105 days.

Cultures failed.

PIGEON 57.

Intravenous:

Emulsion of growth from outside of capsule.

Killed after 157 days.

P.M.—No tuberculosis.

GUINEA-PIGS

—	No.	Method.	Duration of Life.	Result.
E. of deposit from interior of capsule.	2959	Intrap.	D. 66 days	Chronic G.T. not severe.
E. of growth from outside of capsule.	2960	Intrap.	D. 66 „	Very slight T.

Emulsion of contents of capsule.

PIGEON 73.

Intravenous and Subcutaneous.

Killed after 148 days.

P.M.—No tuberculosis.

RABBIT 2047.

Intravenous.

Killed after 182 days.

P.M.—No tuberculosis.

GUINEA-PIG 3331.

Intraperitoneal.

Killed after 109 days.

P.M.—One fibrous nodule containing caseo-purulent foci in omentum only.

Culture tubes sown remained sterile.

Summary of Experiment Illustrated by Chart C.

This chart gives the results of the passage of the culture from Pigeon 19 through two pigeons in series (Pigeons 27 and 35) and two fowls (Fowls 99 and 97); the culture recovered from the capsule of the last pigeon (Pigeon 35) was inoculated into two capsules, each of which was introduced into the peritoneal cavity of a fowl. One of these fowls (Fowl 97) showed, when killed, projecting from the abdominal wall a mass with a scab in the most dependent part; in this mass the capsule was found ruptured and broken up; it had probably not been inserted into the peritoneal cavity but into the subperitoneal tissues. Cultures from material from the outside of the collodion became contaminated.

Cultures sown from the contents of the other capsule (in Fowl 99) remained sterile and the animals inoculated did not develop tuberculosis.

In this branch of the experiment the culture had been passed through four pigeons and one fowl; the culture from the fourth pigeon (total duration of residence, 381 days) resembled the original culture; a further residence of 194 days in the peritoneal cavity of a fowl caused the death of the bacilli.

VIRUS H 53. "D.H." *(a)—continued.*

Collodion Capsule Passage Experiment—*continued.*

CHART D.

CULTURE.

Obtained from the contents of the capsule removed from Pigeon 19 (*see* Chart A), and cultivated artificially for 62 days.

CAPSULE: PIGEON 33.
Inserted: July 10, 1907.
Removed: November 28, 1907.
(*Soft capsule, collapsed.*)
Duration of residence: 141 days.

Emulsion of contents of capsule.

CULTURE.
Cultivated artificially for 22 days.

CAPSULE: PIGEON 53.
Inserted: Dec. 20, 1907.
Removed: April 10, 1908.
(*Soft capsule, ruptured.*)
Duration of residence: 112 days.

GUINEA-PIGS.

Number.	Method.	Duration of Life.	Result.
2787	Intrap.	D. 54 days	Severe G.T.
2788	Intrap.	D. 45 "	G.T.

PIGEON 37.
Intramuscular.
Killed after 134 days.
P.M.—No tuberculosis.

Emulsion of growth from exterior of capsule.

CULTURE.
Two colonies only grew on the primary culture tube; these were isolated and cultivated separately for 63 days.

GUINEA-PIG 3025.
Subcutaneous.
Killed after 110 days.
P.M.—Slight chronic G.T.

PIGEON 59.
Intravenous.
Killed after 189 days.
P.M.—No tuberculosis.

(Colony 1.)
CAPSULE: FOWL 115.
Inserted: June 12, 1908.
Removed: March 8, 1909.
(*Soft capsule, ruptured.*)
Duration of residence: 269 days.

(Colony 2.)
CAPSULE: FOWL 117.
Inserted: June 12, 1908.
Removed: Oct. 16, 1908.
(*Soft capsule, collapsed.*)
Duration of residence: 126 days.

Emulsion of scrapings from inside of capsule.

GUINEA-PIGS 3332 & 3333.
Intraperitoneal.
Killed after 108 days.
No tuberculosis.

Culture tubes sown remained sterile.

Emulsion of growth from exterior of capsule.

PIGEON 79.
Intravenous.
Killed after 106 days.
P.M.—No tuberculosis.

RABBIT 2184.
Intravenous.
Died in 95 days.
P.M.—Slight G.T.

GUINEA-PIG 3616.
Subcutaneous.
Died in 182 days.
P.M.—General tuberculosis.

Cultures failed.

Summary of Experiment Illustrated by Chart D.

This branch also began with the culture from the collodion capsule of Pigeon 19 (*see* Chart A).

The culture was passed through two pigeons in succession and was then inoculated into two capsules each of which was introduced into the peritoneal cavity of a fowl.

On the tubes sown from the last pigeon (Pigeon 53) only two colonies grew and these were separately cultivated, a serum culture of one being used for one capsule (Fowl 115) and a small quantity of a glycerin-serum culture of the other for a second capsule (Fowl 117); the cultures resembled in their cultural characters the original culture.

The bacilli taken from Fowl 117, after a residence of 126 days, were apparently dead.

The other capsule removed from Fowl 115 after 269 days was ruptured and around it were masses of a yellow waxy substance. This was emulsified and tested; the two guinea-pigs inoculated with it died within twenty-four hours, a rabbit had slight general tuberculosis, and a pigeon remained healthy. All the egg tubes sown with the emulsion became contaminated.

The bacilli from the final capsule of this branch were therefore not virulent for the pigeon and produced in a rabbit ordinary mammalian tuberculosis; the total period of residence was 685 days, 416 days in four pigeons and 269 days in one fowl.

There was no change therefore in the cultural characters or the virulence of the culture derived from the original material of Virus H 53. "D.H." (*a*) after a passage in collodion capsules through five series of fowls and pigeons, during periods varying from 184 to 685 days.

VIRUS H 53. "D.H." (*a*)—*continued.*

CHART E.—ILLUSTRATING THE PASSAGE OF BACILLI FROM ONE OF THE CAPSULES THROUGH A PIGEON AND FOWLS.

An emulsion of the contents of the capsule from Pigeon 33 (3rd capsule) (*see* Chart D), was inoculated on Nov. 28, 1907, into :

PIGEON 39.
Intravenous.
Killed after 135 days.
P.M.—No tuberculosis.

Emulsion of spleen and left lung.

GUINEA-PIG 3026.
Subcutaneous.
Killed after 109 days.
P.M.—Slight chronic G.T.

CULTURE.
Obtained from the spleen : cultivated artificially for 43 days.

FOWL 127.
Intravenous.
Dose : 10·0 mg.
Died in 41 days.
P.M.—No macroscopic tuberculosis. T.B. in lungs and spleen.

RABBIT 2001.
Intravenous.
Dose : 0·1 mg.
Died in 24 days.
P.M.—General miliary T.

Emulsion of lung.

CULTURE.
Cultivated artificially for 51 days.

RABBITS.

Number.	Method.	Duration of Life.	Result.
2048	Intrav.	D. 144 days	Slight generalised T.
2049	Intrav.	D. 168 ,,	T. of lungs, and of kidneys (severe).

GUINEA-PIG 3334.
Subcutaneous.
Died in 87 days.
P.M.—General tuberculosis.

FOWL 145.
Intravenous.
Dose : One serum culture.
Died in 25 days.
P.M.—Acute tuberculosis.

FOWL 147.
Intramuscular.
Dose : One serum culture.
Killed after 193 days.
P.M.—Caseo - necrotic patch in pectoral muscle only.

GUINEA-PIGS.
(E. of local lesion.)

Number.	Method.	Duration of Life.	Result.
3789	Subcut.	K. 36 days	Healthy.
3790	Intrap.	K. 36 ,,	,,

Summary of Experiment Illustrated by Chart E.

Passage of bacilli from one of the capsules through a pigeon and two fowls.

The contents of the capsule from Pigeon 33 (3rd capsule) were inoculated into two pigeons, one intramuscularly (Pigeon 37) and one intravenously (Pigeon 39) ; neither showed any sign of tuberculosis when killed 134 and 135 days after inoculation. An emulsion of the spleen and left lung of the intravenous pigeon however produced tuberculosis in a guinea-pig and a culture was isolated from its tuberculous spleen. This culture was inoculated intravenously into a fowl and a rabbit ; the fowl (Fowl 127) died in 41 days and showed no macroscopic tuberculosis, but tubercle bacilli were found in the lung and spleen ; the rabbit died of miliary tuberculosis. A culture was isolated from the lung of Fowl 127 and inoculated into two fowls, one intravenously (Fowl 145) the other intramuscularly (Fowl 147) ; the intravenous fowl died in 25 days of acute tuberculosis (results similar to this had been obtained by intravenous inoculation of the original culture), the fowl inoculated intramuscularly was killed after 193 days and showed a caseo-necrotic patch in the pectoral muscles and no sign of disease elsewhere. An emulsion of the local lesion though containing numerous tubercle bacilli did not produce tuberculosis in guinea-pigs. Thus the bacilli from the last fowl of this passage were dead. The bacilli from the fowl immediately preceding were unchanged in cultural characters and virulence.

EXPERIMENT WITH VIRUS H 66. "W.C." [Tuberculosis of Bones.

CULTURE.

Derived from the pus from a lumbar abscess through Guinea-pig 1945; duration of artificial cultivation, 4½ months.

CAPSULE: PIGEON 11.
Inserted: January 11, 1907.
Removed: May 7, 1907.
(*Hard capsule, not collapsed.*)
Duration of residence: 116 days.

Deposit on exterior of capsule.

FOWL 47.
Intramuscular.
Killed after 101 days.
P.M.—Caseo-necrotic gritty patch at seat of inoculation only.

Contents of capsule.

GUINEA-PIG 2425.
Intraperitoneal.
Killed after 196 days.
P.M.—No tuberculosis.

All the culture tubes sown both with the contents, and the deposit on the exterior of the capsule, remained sterile.

CAPSULE: PIGEON 13.
Inserted: January 11, 1907.
Removed: May 7, 1907.
(*Hard capsule, not collapsed.*)
Duration of residence: 116 days.

Contents of capsule.

GUINEA-PIG 2426.
Intraperitoneal.
Killed after 196 days.
P.M.—No tuberculosis.

The culture tubes sown remained sterile.

Summary of Experiment.

The culture used was obtained from a lumbar abscess in a boy aged 15 years suffering from tuberculosis of the vertebral column; the cultural characters and virulence of the strain were those of the human tubercle bacillus.

Half a serum culture was put into each of two capsules, and each capsule remained in the peritoneal cavity of a pigeon for a period of 116 days.

Egg tubes sown with the contents of each capsule at the end of this period remained sterile, and the animals inoculated did not develop tuberculosis.

EXPERIMENT WITH VIRUS H 67. "E.P." [Tuberculosis of Bones.]

CULTURE.

Derived from the pus from a scapular abscess through Guinea-pig 1914.
Duration of artificial cultivation, 5 months.

CAPSULE: PIGEON 7.
Inserted: December 14, 1906.
Removed: April 23, 1907.
(*Hard capsule, not collapsed.*)
Duration of residence: 130 days.

Contents of capsule.

Culture tubes sown remained sterile.

RABBIT 1268.
Intravenous.
Killed after 84 days.
P.M.—No tuberculosis.

GUINEA-PIG 2387.
Intraperitoneal.
Killed after 77 days.
P.M.—A few caseous nodules in omentum only.

CAPSULE: PIGEON 9.
Inserted: December 14, 1906.
Removed: April 23, 1907.
(*Hard capsule, not collapsed.*)
Duration of residence: 130 days.

Contents of capsule.

RABBIT 1269.
Intravenous.
Killed after 84 days.
P.M.—No tuberculosis.

GUINEA-PIG 2388.
Intraperitoneal.
Killed after 77 days.
P.M.—No tuberculosis.

Culture tubes sown from the contents of the capsule remained sterile.

Summary of Experiment.

The culture used in this experiment was obtained from the pus of a scapular abscess in a girl aged 14 years suffering from multiple tuberculosis of bones; its cultural characters and virulence were those of the human tubercle bacillus.

An emulsion of one serum culture was put into each of two capsules, one of which was inserted into the peritoneal cavity of Pigeon 7, the other into that of Pigeon 9.

The capsules were removed 130 days later, and cultures sown and animals inoculated with their contents. All the culture tubes remained sterile, and none of the animals inoculated developed tuberculosis; the bacilli had apparently all died.

II.

CULTURE.

Derived from the original material (pus from abscess) through Guinea-pig 1914.
Duration of artificial cultivation, 7½ months.

CAPSULE: FOWL 39.
Inserted: March 1, 1907.
Removed: April 29, 1907.
(*Hard capsule, ruptured.*)
Duration of residence: 59 days.

Culture tubes sown from the contents of the capsule remained sterile.

Summary.

Another culture from this virus was put in a collodion sac into the peritoneal cavity of a fowl (Fowl 39).

The capsule was removed 59 days later, and cultures were made from its contents. All the egg tubes sown remained sterile.

EXPERIMENTS WITH VIRUS H 68. "R.B." [Tuberculosis of the Sacrum.]

I.

CULTURE.

Derived from the pus from a sacral abscess.
Duration of artificial cultivation : 218 days.

CAPSULE : FOWL 17.
Inserted : Dec. 5, 1906.
Removed : April 22, 1907.
(*Hard capsule, not collapsed.*)
Duration of residence : 138 days.

Emulsion of contents of capsule.

FOWL 45.
Intramuscular.
Killed after 84 days.
P.M.—No tuberculosis.

GUINEA-PIGS.

Number.	Method.	Duration of Life.	Result.
2385	Intrap.	K. 78 days	Each showed a few caseous nodules in omentum only.
2386	„	K. 78 „	

The culture tubes sown remained sterile.

CAPSULE : FOWL 18.
Inserted : Dec. 5, 1906.
Removed : April 23, 1907.
(*Hard capsule, not collapsed.*)
Duration of residence: 139 days.

Emulsion of contents of capsule.

The culture tubes sown remained sterile.

RABBIT 1270.
Intravenous.
Killed after 84 days.
P.M. — No tuberculosis.

GUINEA-PIG 2389.
Intraperitoneal.
Killed after 88 days.
P.M. — A few small caseous nodules in omentum only.

Summary of Experiment I.

The culture used was obtained from a case of tuberculosis of the sacrum in a man aged 69 ; the culture grew luxuriantly and was slightly virulent for the calf and rabbit.

Two capsules were filled, one with an emulsion in broth of a serum culture, the other with an emulsion in broth of a glycerin-serum culture, and each was inserted into the peritoneal cavity of a fowl.

One was removed after a period of 138 days, the other after a period of 139 days. Egg tubes sown with the contents of each capsule remained sterile and none of the animals inoculated developed tuberculosis.

II.

CULTURE.

Derived from the prepectoral gland of Calf 1161 (1st passage).

Cultivated artificially for 127 days.

CAPSULE : PIGEON 29.
Inserted : June 13, 1907.
Removed : Oct. 9, 1907.
(*Hard capsule, not collapsed.*)
Duration of residence : 118 days.

E. of contents of capsule.

FOWL 63.
Subcutaneous.
Killed after 240 days.
P.M.—Small fibronecrotic mass at seat of inoculation only.

Culture tubes sown from the local lesion remained sterile.

Cultures failed.

Cultivated artificially for 154 days.

CAPSULE : FOWL 57.
Inserted : July 10, 1907.
Removed : Dec. 6, 1907.
(*Soft capsule, collapsed.*)
Duration of residence : 149 days.

Emulsion of contents of capsule.

GUINEA-PIG 2835.
Intraperitoneal.
Killed after 102 days.
P.M.—T. of the omentum and spleen and some of the abdominal lymph glands.

A culture obtained from the portal gland of the guinea-pig grew like the original culture.

RABBIT 1582.
Intravenous.
Killed after 103 days.
P.M. — A few doubtful grey foci in lungs only.

PIGEON 45.
Intramuscular.
Killed after 173 days.
P.M.—No tuberculosis.

Culture tubes sown remained sterile.

Summary of Experiment II.

In another experiment with this virus a strain from one of the calves inoculated with the original culture was used.

In one case the bacilli resided in the peritoneal cavity of a pigeon for a period of 118 days and in another in the peritoneal cavity of a fowl for 149 days. The bacilli in the pigeon capsule were dead. Cultures from the fowl capsule failed ; a pigeon inoculated with some of the contents of the capsule remained healthy, a rabbit inoculated intravenously showed a few doubtful grey foci in the lungs and a guinea-pig developed slight tuberculosis. A culture isolated from the portal gland of this guinea-pig resembled the original culture. The living bacilli in the capsule removed from the fowl had not therefore undergone any change in virulence.

EXPERIMENT WITH VIRUS H 70. "N.W." [Primary Abdominal Tuberculosis.]

CULTURE.

Derived from the human lung, direct.
Duration of artificial cultivation : 158 days.

CAPSULE: PIGEON 5.

Inserted : November 23, 1906.
Removed : April 22, 1907.
(*Hard capsule, not collapsed.*)
Duration of residence : 150 days.

Contents of capsule.

GUINEA-PIGS.

Number.	Method.	Duration of Life.	Result.
2383	Intrap.	K. 77 days	A number of caseous and softened nodules in omentum only.
2384	Intrap.	K. 77 „	No tuberculosis.

The culture tubes sown remained sterile.

Summary.

The culture used was obtained from the lung of a child aged 10 months who died of general tuberculosis; the cultural characters and virulence of the strain were those of the human tubercle bacillus.

One serum culture was put into the capsule which was left in the peritoneal cavity of a pigeon 150 days.

Egg tubes sown with the contents of the capsule at the end of this period remained sterile, and two guinea-pigs inoculated intraperitoneally did not develop tuberculosis.

EXPERIMENT WITH VIRUS H 71. "L.V." (*a*). [Lupus.]

CULTURE.

Derived from the original material through Guinea-pig 1937.
Duration of artificial cultivation : 3 months.

Serum culture.

CAPSULE : FOWL 12.

Inserted : November 19, 1906.
Removed : April 10, 1907.
(*Hard capsule, not collapsed.*)
Duration of residence : 142 days.

Contents of capsule.

All the culture tubes sown remained sterile.

GUINEA-PIGS.

Number.	Method.	Duration of Life.	Result.
2335	Subperit.	K. 89 days	Caseo-purulent cyst at seat of inoculation only.
2336	Intrap.	K. 89 „	Caseo - pus in subcutaneous tissues at seat of inoculation and small softened caseous nodules in omentum.

Glycerin-serum culture.

CAPSULE: FOWL 13.

Inserted : Nov. 19, 1906.
Removed : March 15, 1907.
(*Hard capsule, not collapsed.*)
Duration of residence : 116 days.

Contents of capsule.

FOWL 43.
Intravenous.
Killed after 122 days.

P.M.—The lungs contained a moderate number of glassy tubercles. Other organs and the glands were normal.

All the culture tubes sown remained sterile.

Summary of Experiment.

The culture used was obtained from a case of lupus in a girl aged 14 years; in cultural characters and virulence it closely resembled the slightly virulent human tubercle bacillus.

Two capsules were filled, one with a broth emulsion of a serum culture, the other with a broth emulsion of a glycerin-serum culture.

Each capsule was inserted into the peritoneal cavity of a fowl and left therein for a period of 142 days in one case and 116 days in the other.

At the end of these periods the bacilli in the capsules were tested and found to be dead.

EXPERIMENT WITH VIRUS H 78. "O.D." [General Tuberculosis.]

CULTURE.
Derived from the human lung through Guinea-pig 2123.
Duration of artificial cultivation : 337 days.

CAPSULE : PIGEON 49.
Inserted : Dec. 13, 1907.
Removed : Aug. 15, 1908.
(*Soft capsule, collapsed.*)
Duration of residence : 246 days.

Emulsion of material from inside capsule.

GUINEA-PIGS.

Number.	Method.	Duration of Life.	Result.
3211	Intrap.	K. 90 days	No tuberculosis.
3212	Subcut.	K. 90 „	General tuberculosis.

PIGEON 69.
Intravenous.
Killed after 207 days.
P.M. — No tuberculosis.

Culture tubes sown remained sterile.

SUMMARY OF EXPERIMENT.

The strain used was derived from the lung of a child aged 9 months who died of general tuberculosis and broncho-pneumonia. It exhibited the properties (cultural characters and virulence) of a human tubercle bacillus.

The growth from an egg tube with a little of the egg was pipetted into the capsule which was then filled with fresh unheated bovine serum.

The capsule was found in the peritoneal cavity of the pigeon surrounded by the usual thin fibrous membrane, collapsed but not obviously ruptured. There was some culture within the capsule but no fluid.

An emulsion was made of the culture and this was used to inoculate some egg tubes, two guinea-pigs, and a pigeon. Microscopically the emulsion showed numerous short tubercle bacilli.

The egg tubes remained sterile, one of the guinea-pigs became tuberculous, the other and the pigeon remained healthy.

After a residence of 246 days in the peritoneal cavity of a pigeon, therefore, only a few of the bacilli placed in the capsule remained alive ; those that survived were unaltered in their virulence for the guinea-pig.

EXPERIMENT WITH VIRUS H 81. "P.W." [Tuberculosis of Lung.]

CULTURE.
Derived from the human lung, direct.
Duration of artificial cultivation : 127 days.

CAPSULE : PIGEON 21.
Inserted : June 5, 1907.
Removed : Sept. 16, 1907.
(*Hard capsule, not collapsed.*)
Duration of residence : 103 days.

CULTURE.
Obtained from contents of capsule : cultivated artificially for 38 days.

CAPSULE : FOWL 65.
Inserted : Oct. 24, 1907.
Removed : May 26, 1908.
(*Soft capsule, ruptured.*)
Duration of residence : 215 days.

Emulsion of deposit on exterior of capsule.

Culture tubes sown remained sterile.

PIGEON 61.
Intravenous.
Killed after 83 days.
P.M.—No tuberculosis.

GUINEA-PIG 3085.
Intraperitoneal.
Killed after 81 days.
P.M.—No tuberculosis.

CAPSULE : PIGEON 23.
Inserted : June 5, 1907.
Removed : Sept. 16, 1907
(*Hard capsule, not collapsed.*)
Duration of residence : 103 days.

Culture tubes sown from the contents of the capsule remained sterile.

SUMMARY OF EXPERIMENT.

The culture used in this experiment was derived from the tuberculous lung of a man aged 33 ; the culture grows luxuriantly on artificial media and is only slightly virulent for the calf and rabbit.

The growth from one large glycerin-serum tube was emulsified in broth and two capsules were filled with the emulsion.

One capsule was left in the peritoneal cavity of a pigeon (Pigeon 23) for a period of 103 days. Egg tubes sown with the fluid remained sterile.

The other capsule also remained in the peritoneal cavity of a pigeon (Pigeon 21) for a period of 103 days and the culture was recovered from its contents; this culture grew like the original culture.

After 38 days artificial cultivation it was inoculated in a fresh capsule which was allowed to remain in the peritoneal cavity of a fowl (Fowl 65) for a period of 215 days. On the outside of the ruptured capsule there was some yellow material which was emulsified and used to inoculate egg tubes, a guinea-pig, and a pigeon. All the tubes remained sterile and neither the guinea-pig nor the pigeon developed tuberculosis.

After a residence therefore of 103 days in the peritoneal cavity of a fowl the culture recovered from the capsule grew like the original; after a further residence of 215 days in a pigeon the bacilli were apparently dead.

EXPERIMENT WITH VIRUS H 85. "H.B." [Lupus.]

CULTURE.

Derived from the original material through G.P. 2365.
Duration of artificial cultivation: 242 days.

TWO CAPSULES: FOWL 83.

Inserted: Feb. 4, 1908.
Removed: Oct. 9, 1908.
(*Soft capsules, collapsed.*)
Duration of residence: 249 days.

Emulsion of material from the exterior and interior of the capsules.

PIGEON 71.
Intravenous.
Killed after 154 days.
P.M.—No tuberculosis.

RABBIT 2034.
Intravenous.
Killed after 161 days.
P.M.—No tuberculosis.

GUINEA-PIGS.

Number.	Method.	Duration of Life.	Result.
3323	Intrap.	K. 161 days	No tuberculosis.
3324	Subcut.	K. 161 „	Slight T. of spleen, portal gland and bronchial glands.

Culture tubes sown remained sterile.

SUMMARY OF EXPERIMENT.

The strain used was derived from a case of lupus in a boy aged 5 years; the culture grows like a bovine tubercle bacillus; its virulence for the calf and rabbit is however intermediate between that of the bovine and of the human tubercle bacillus.

Two large capsules were inserted into the peritoneal cavity of Fowl 83 and each contained one serum culture emulsified in one case with broth and in the other with glycerin-gelatine.

They remained in the peritoneal cavity for a period of 249 days. Both capsules were collapsed but not apparently ruptured; just within the glass collar of each there was a deposit of culture and there was some yellow greasy material on the outside of the collodion. The culture from each collar was removed and separately emulsified the yellow substance from the outside of the capsule being included in one case. Cultures from each emulsion remained sterile. The emulsions were mixed together and two guinea-pigs, a rabbit and a pigeon inoculated. One of the guinea-pigs developed slight tuberculosis, the other animals remained healthy.

Most of the bacilli in the capsules therefore as shown by the culture and inoculation tests were dead; the few bacilli which had survived had not undergone any change in their virulence for the guinea-pig as a result of a sojourn of 249 days in the peritoneal cavity of a fowl.

EXPERIMENT WITH VIRUS H 87. "W.D." [Tuberculosis of the Suprarenal bodies.]

CULTURE.

Derived from the human suprarenal body through a guinea-pig.
Duration of artificial cultivation: 82 days.

CAPSULE: FOWL 59.

Inserted: July 17, 1907.
Removed: Dec. 10, 1907.
(*Soft capsule, collapsed.*)
Duration of residence: 146 days.

Emulsion of contents of capsule.

PIGEON 47.
Intravenous and Subcutaneous.
Killed after 311 days.
P.M.—No tuberculosis.

RABBIT 1590.
Intravenous.
Killed after 99 days
P.M.—One minute glassy focus in lung only.

GUINEA-PIG 2843.
Intraperitoneal.
Killed after 98 days.
P.M.—No tuberculosis.

Culture tubes sown from the deposits on the exterior, and from the contents, remained sterile.

SUMMARY OF EXPERIMENT.

The culture used was derived from a tuberculous suprarenal body in a man aged 21 years; it grew luxuriously on artificial media and possessed slight virulence for the calf and rabbit.

The capsule was a large one and two serum cultures emulsified in broth were placed in it. It was inserted in the peritoneal cavity of Fowl 59.

The capsule was removed 146 days after insertion and was found in a fibrous capsule collapsed but not apparently ruptured; a few tubercle bacilli were, however, found in some material on the outside of the capsule.

Cultures sown from material from within and without the capsule remained sterile. A guinea-pig, a rabbit, and a pigeon inoculated with an emulsion of the contents of the capsule remained healthy.

It must be concluded from these results that the bacilli taken from the capsule were dead.

EXPERIMENT WITH VIRUS H 90. "I.P." [Primary Abdominal Tuberculosis.]

CULTURE.

Derived from the human retro-peritoneal gland, direct.
Duration of artificial cultivation, 132 days.

CAPSULE: PIGEON 51.

Inserted: December 13, 1907.
Removed: August 15, 1908.
(*Soft capsule, collapsed.*)
Duration of residence: 246 days.

Emulsion of material from interior and exterior of capsule.

The culture recovered from the capsule resembled the original culture.

PIGEON 67.
Intravenous.
Killed after 207 days.
P.M.—No tuberculosis.

RABBIT 1973.
Intravenous.
Killed after 90 days.
P.M.—Two nodules in the lungs only.

GUINEA-PIGS.

Number.	Method.	Duration of Life.	Result.
3213	Intrap.	K. 90 days	Moderately severe G.T.
3214	Subcut.	K. 90 „	

SUMMARY OF EXPERIMENT.

The culture used in this experiment was obtained from a caseous retro-peritoneal gland in an old man aged 70, who died of pneumonia. The culture grew luxuriantly on artificial media and produced progressive tuberculosis in calves and rabbits; it was subsequently shown to be a mixture of human and bovine tubercle bacilli.

The capsule remained in the peritoneal cavity of Pigeon 51 for a period of 246 days. The culture recovered from the material from within and from without the capsule resembled the original culture in cultural characters. An emulsion of this material produced general tuberculosis in two guinea-pigs, two nodules in the lung of a rabbit and no tuberculosis in a pigeon.

The bacilli were therefore unchanged in cultural characters and virulence after a residence of 246 days in the peritoneal cavity of a pigeon.

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TUBERCULOSIS PROBABLY PRIMARY IN THE ALIMENTARY TRACT.

Designation of Virus.	Date of Receipt of Virus.	Age and Sex of Patient.	Description of Tuberculosis.	Cause of Death.	Abstract of Post Mortem Notes.	Cultures.		Species of Animals Tested.	Classification of Virus according to Cultural Characters and Virulence.
						Original Material.	How obtained.		
H. 69. "F.K."	May 17, 1906.	2 years Female.	Primary abdominal tuberculosis.	Tuberculous meningitis.	Some small ulcerations were seen in the ileum, and in the mesentery there was a gland the size of a large bean with caseous contents. Numerous grey tubercles between 1 and 2 mm. in diameter were seen on the pia mater. There was slight tuberculous perisplenitis, but no tubercles in the spleen substance, or in the lungs, liver, or kidneys. T.B. were found in an emulsion of the mesenteric gland, none was seen in an emulsion of the meninges.	Mesenteric gland. Meninges.	Through the guineapig. Through the guineapig.	Calf. Rabbit. Guineapig. Cat.	Group I.
H. 70. "N.W."	June 18, 1906.	10 months Female.	Primary abdominal tuberculosis.	Tuberculous meningitis and general tuberculosis.	Plentiful early ulceration of the lymphoid patches of the intestine. All the mesenteric glands were infiltrated with caseating foci and larger irregular firm caseating patches. There were numerous miliary tubercles in the liver, spleen, and lungs; the latter also contained two irregular caseating nodules, one 3 cm. the other 0·6 cm. in diameter. The bronchial glands were enlarged and caseating. A few grey tubercles were seen in the kidneys and on the peritoneum. One cervical gland contained a fibrous tubercle. There was early basal tuberculous meningitis. T.B. were scanty in smears from the lung and mesenteric gland, and none was seen in smears from the cervical gland, liver, and spleen.	Mesenteric glands. Cervical gland. Lung Bronchial gland.	Through the guineapig. Through the guineapig. Direct. Direct.	Pig. Rabbit. Guineapig. Dog. Cat. Rat.	Group II.
H. 74. "D.S."	Nov. 20, 1906.	7 months Female.	Primary abdominal tuberculosis.	Tuberculous meningitis.	Only one doubtful ulcer was seen in the intestine. The mesenteric glands contained caseous and softened nodules. The spleen was closely beset with grey miliary tubercles; the lungs were crepitant, and contained similar tubercles, not so numerous. There were numerous greyish-white tubercles in the liver, and a few in the kidneys. Two bronchial glands were dense white and caseated; two others were less severely affected. There were numerous grey miliary tubercles in the meninges. T.B. were scanty in the lesions.	Mesenteric gland. Bronchial gland. Spleen Lung	Direct. Direct, and through the guineapig. Direct. Through the guineapig.	Calf Rabbit. Monkey. Guineapig. Cat.	Group II.
H. 75. "A.H."	Nov. 29, 1906.	7 years Female.	Primary abdominal tuberculosis.	Tuberculous peritonitis.	Two or three ulcers were seen in the jejunum; several of the mesenteric glands were slightly enlarged and contained caseous nodules, the largest 5 mm. in diameter. The ileo-colic glands were enlarged, and contained a few caseous tubercles. The parietal and visceral peritoneum was everywhere thickly studded	Peritoneal fluid. Lung	Through the guineapig. Through the guineapig.	Calf. Rabbit. Guineapig. Cat.	Group II.

					with tubercles, and there were adhesions everywhere. No tubercles were seen in the substance of the liver, spleen, and kidneys. Lungs: The apex of the right lung was in a state of grey hepatization, and contained a caseous nodule (1 cm.); elsewhere the lungs were deeply congested, but contained no tubercles. The pericardium was full of fluid, and the heart was covered with thick lymph. The bronchial glands were fused together forming a mass 3·2 cm. in diameter, and were extensively caseous. A few T.B. were seen in smears from the lung nodule and a bronchial gland; none was seen in smears from the spleen and liver.				
H. 77. "R.L."	Dec. 11, 1906.	13 months Male.	Primary abdominal tuberculosis.	Tuberculous peritonitis.	Both the small and large intestines showed tuberculous ulceration. The mesenteric glands were enlarged and composed of firm caseous substance. The parietal and visceral peritoneum was profusely covered with small tubercles (the mesentery was closely studded with firm caseous nodules up to a hemp seed in size). The lungs, liver, spleen, and kidneys were normal in appearance. T.B. were fairly numerous in the mesenteric glands and nodules and in a scraping from an intestinal ulcer.	Mesenteric glands. Liver	Direct, and through the rabbit. Through the guineapig.	Calf. Rabbit. Guineapig.	Group I.
H. 78. "O.D."	Dec. 13, 1906.	9 months Male.	General tuberculosis probably primary in cervical glands.	General tuberculosis and bronchopneumonia.	The cervical glands were caseous; the intestines and mesenteric glands were normal. There were numerous discrete caseous tubercles up to 2 mm. scattered throughout the lungs, and there were two large patches of pneumonic consolidation. The bronchial glands were enlarged, caseous, and softened. The spleen was very closely beset with soft caseous tubercles; one or two small tubercles were seen in the liver and kidneys. Opaque whitish tubercles were seen on the meninges. T.B. were scanty in the lesions; none was seen in an emulsion of the spleen.	Bronchial glands. Lung Meninges	Direct, and through the guinea-pig. Through the guineapig. Through the guineapig.	Calf. Rabbit. Guineapig.	Group II.
H. 82. "G.F."	Feb. 7, 1907.	4 years Male.	General tuberculosis primary in the alimentary tract.	Pleurisy and pericarditis.	One cervical gland contained a dense fibro-caseous nodule (a smear showed T.B.). The mesenteric glands contained about a dozen dense caseous nodules up to a barley grain in size; some were distinctly calcareous, others showed foci of softening. The intestines were healthy. In the left upper lobe of the lung there were scattered grey miliary tubercles and a firm caseous nodule (1 cm.) beginning to soften in the centre and surrounded by a fibrous capsule. No tubercles were seen elsewhere in the lung. An interbronchial gland was enlarged caseous throughout and partly softened; several left praetracheo-bronchial glands were similar, others were dense creamy-white with foci of calcification. In the spleen there were about half-a-dozen caseous tubercles (smear, a few T.B. seen). The liver and kidneys were normal. T.B. were numerous in the caseous nodule from the lung and in a smear from a bronchial gland. Three separate emulsions of nodules from the mesenteric glands were examined; no T.B. were found in them. The death of the patient was apparently due to pleurisy and pericarditis (streptococcus isolated).	Mesenteric gland. Lung	Through the guineapig. Through the guineapig.	Rabbit. Guineapig.	Group II.

TUBERCULOSIS PROBABLY PRIMARY IN THE ALIMENTARY TRACT—*continued.*

Designation of Virus.	Date of Receipt of Virus.	Age and Sex of Patient.	Description of Tuberculosis.	Cause of Death.	Abstract of Post Mortem Notes.	Cultures.		Species of Animals Tested.	Classification of Virus according to Cultural Characters and Virulence.
						Original Material.	How obtained.		
H. 83. "G.C."	Feb. 22, 1907.	$1\frac{3}{4}$ years Female.	General tuberculosis primary in the alimentary tract.	Tuberculous meningitis.	One cervical gland showed irregular firm caseous patches, another a single soft caseous patch. In the mesenteric glands there were a dozen opaque whitish nodules up to a millet seed in size. There was no ulceration of the intestines. The lungs contained numerous grey miliary tubercles; there was some consolidation of the right apex; no cavities were seen. The bronchial glands were enlarged, caseous throughout and beginning to soften. The spleen showed on the surface flattened grey tubercles and patches and contained numerous miliary tubercles, some caseous in the centre; the liver showed scattered submiliary tubercles; there were one or two tubercles in each kidney. The meninges were studded with small grey tubercles. T.B. were found in smears from the cervical, mesenteric, and bronchial glands, and in an emulsion of the meninges; none was found in an emulsion of the spleen.	Mesenteric gland. Bronchial gland. Meninges Spleen	Direct. Direct. Through the guineapig. Through the guineapig.	Rabbit. Guineapig.	Group II.
H. 88. "E.L."	May 27 1907.	8 years 7 months. Female.	Primary abdominal tuberculosis.	Multiple stricture of the gut (tuberculous).	The intestines were very distended with about a dozen constrictions due to cicatrization of circular tuberculous ulcerations. The mesenteric glands were enlarged firm reddish and gelatinous, and contained fairly numerous whitish caseous tubercles and a few small irregular caseous patches formed by confluent tubercles. In the bronchial glands there were two opaque miliary tubercles. There was one doubtful tubercle in the liver, and some peritonitis associated with the ulceration of the intestine (the peritoneum was otherwise normal). The lungs, spleen, kidneys, and meninges of brain were normal. T.B. were fairly numerous in a smear from a bronchial gland tubercle, scanty in an emulsion of mesenteric glands.	Mesenteric glands.	Direct, and through the guineapig.	Calf. Rabbit. Guineapig.	Group I.
H. 89. "W.I."	June 12, 1907.	4 years Male.	Primary abdominal tuberculosis.	General tuberculosis.	The intestine was very extensively ulcerated, especially in the first part of the colon. The mesenteric glands were enlarged: some were caseous throughout, others showed patches of confluent yellow tubercles, others again contained a few tubercles or groups of tubercles; the caseous substance was usually firm, but in one gland there was a soft caseo-necrotic mass. The lungs were closely beset with greyish-white caseous tubercles up to a millet seed in size; there were no areas of collapse and no cavities. The bronchial glands were slightly enlarged and congested. The kidneys contained tubercles; none could be found in the spleen substance, but there were some on the surface. No definite tubercles were seen in the liver. The peritoneum was affected only in the neighbourhood of the ulcers. T.B. were very numerous in emulsions of the lung and the mesenteric glands.	Mesenteric gland. Lung	Direct, and through the guineapig. Through the guineapig.	Calf. Rabbit. Guineapig.	Group I.

H. 90. "I.P."	Aug. 3, 1907.	70 years Male.	Primary abdominal tuberculosis.	Pneumonia	The intestines were 'much matted together and bound down with old adhesions'; the mucous membrane was normal. Four mesenteric glands were enlarged; one was three parts softened and purulent, the others being composed of pinkish tissue infiltrated with yellowish foci: one or two other glands contained groups of softened foci. A group of four retro-peritoneal glands were apparently enlarged, and one contained an irregular yellow nodule 5 mm. in diameter, the others an occasional yellow focus. Nothing definitely tuberculous was found in the lung, and there was no tuberculosis elsewhere in the body. T.B. were numerous in emulsions from a mesenteric and a retro-peritoneal gland.	Mesenteric gland. Retro-peritoneal gland.	Through the guineapig. Direct.	Rabbit. Calf. Goat. Rabbit. Guineapig.	Group II. Mixture of Group I. and Group II.

TUBERCULOUS MENINGITIS AND SLIGHT TUBERCULOSIS OF LUNG (PRIMARY LESION) AND BRONCHIAL GLANDS.

H. 86. "C.P."	April 26, 1907.	3 years 7 months. Male.	Tuberculosis primary in the lung.	Tuberculous meningitis.	In the lung there was a single cheesy caseous nodule 1 cm. in diameter, slightly gritty from calcification. Two bronchial glands were slightly enlarged and contained each a large friable slightly gritty caseous mass. Two small glands, probably belonging to the peri-tracheo-bronchial group, were affected; one was partly caseous, the other showed a minute yellow focus. The meninges showed fairly numerous minute grey tubercles. There was no tuberculosis elsewhere. T.B. were scanty in emulsions made from the lung nodule and a bronchial gland; none was seen in an emulsion of the meninges.	Meninges	Through the guineapig.	Rabbit. Guineapig. Hedgehog.	Group II.

TUBERCULOUS MENINGITIS OF UNCERTAIN ORIGIN.

H. 98. "B.R."	Jan. 9, 1908.	7 years. Female.	Tuberculous meningitis.	Tuberculous meningitis.	Cerebro-spinal fluid was withdrawn and sent to Blythwood 5 days before the child died. T.B. were moderately numerous in it. Post-mortem examination showed tuberculous meningitis about the base of the brain and the Sylvian fissure; there were tubercles also round the side of the cerebellum, and there was well-marked meningitis of the cord, tubercles being seen on the posterior surface. The lungs were congested, but no tubercles were seen; the bronchial glands were enlarged and showed a few small tuberculous foci. The mesenteric glands were not enlarged, some contained minute foci. The intestines were not ulcerated. There was a small patch of miliary tubercles on the surface of the spleen and on the adjacent parietal peritoneum; the substance of the spleen was normal. The liver and kidneys were normal.	Cerebro-spinal fluid.	Through the guineapig.	Goat. Rabbit. Guineapig. Cat.	Group II.

TUBERCULOUS MENINGITIS OF UNCERTAIN ORIGIN—*continued.*

Designation of Virus.	Date of Receipt of Virus.	Age and Sex of Patient.	Description of Tuberculosis.	Cause of Death.	Abstract of Post Mortem Notes.	Cultures.		Species of Animals Tested.	Classification of Virus according to Cultural Characters and Virulence.
						Original Material.	How obtained.		
H. 115. "N.G"	May 28, 1908.	3 years. Female.	Tuberculous meningitis.	Tuberculous meningitis.	Cerebro-spinal fluid was withdrawn and sent to Blythwood 4 days before the child died. No T.B. were seen in a smear made from the fluid, but guineapigs inoculated with it became tuberculous. No post-mortem examination was made. The child had been ill for 3½ weeks before death, the symptoms of the illness being characteristic of meningitis. There was a history of tuberculosis in the family, the father having died of consumption a few weeks before the death of the child; the mother suffered from a "winter cough."	Cerebro-spinal fluid.	Through the guineapig.	Goat. Rabbit. Guineapig.	Group II.

GENERAL MILIARY TUBERCULOSIS OF UNCERTAIN ORIGIN.

Designation of Virus.	Date of Receipt of Virus.	Age and Sex of Patient.	Description of Tuberculosis.	Cause of Death.	Abstract of Post Mortem Notes.	Original Material.	How obtained.	Species of Animals Tested.	Classification of Virus according to Cultural Characters and Virulence.
H. 60. "W.B."	Jan. 12, 1906.	4 years 7 months. Male.	General miliary tuberculosis.	Tuberculous meningitis and general tuberculosis.	The lungs everywhere contained fairly numerous grey miliary tubercles with yellow centres; the bronchial glands were large and fibro-caseous throughout. The pleura and peritoneum were studded with tubercles. There were numerous tubercles in the liver and spleen, fewer in the kidneys. The meninges of the brain were studded with small grey tubercles. There were numerous tubercles and one or two ulcers in the ileum. The mesenteric glands were swollen and soft, and contained fibro-caseous tubercles, two or three in each gland. The coeliac glands were large, and packed with fibro-caseous tubercles. T.B. were very scanty in smears from the meninges, a bronchial gland, and an emulsion of the mesenteric and coeliac glands; none was seen in smears from the lung.	Meninges	Through the guineapig.	Calf. Rabbit.	Group II.
						Lung	Through the guineapig.	Calf. Rabbit.	Group II.
						Mesenteric glands.	Through the guineapig.	Calf. Monkey. Rabbit.	Group II.
						Bronchial gland.	Through the guineapig.	Calf. Rabbit.	Mixture of Group I. and Group II.
H. 93. "C.D."	Sept. 25, 1907.	2 years 3 months. Male.	General miliary tuberculosis.	Tuberculous meningitis and general tuberculosis.	The lungs were firm, heavy, and very closely beset with caseating tubercles up to 2 mm. in diameter in places confluent; the lung tissue between the tubercles was congested and extensively consolidated: there were no cavities. One of the bronchial glands was large and caseated throughout. Numerous small tubercles were seen along the vessels of the pia mater. The spleen was enlarged showing large numbers of tubercles and there were a few tubercles in the kidneys. About half a dozen small early tuberculous ulcers were seen in the intestines, and there were some tubercles in the mesenteric glands. The cervical glands were caseous. The child was admitted to hospital for acne; two small pieces of skin showing pustules were sent to Blythwood, and microscopical examination of an emulsion made from them showed one T.B. T.B. were numerous in emulsions made from the lung and the bronchial gland.	Lung	Through the guineapig.	Pig. Rabbit. Guineapig.	Group II.
						Acne spots	Through the guineapig.		

TUBERCULOSIS OF THE SUPRARENAL BODIES.

H. 87. "W.D."	April 26, 1907.	21 years. Male.	Tuberculosis of the suprarenal bodies.	Addison's disease.	There was profound general pigmentation. Both the suprarenal bodies showed typical fibro-caseous change; the left was calcareous. Fibro-caseous nodules were seen on the diaphragmatic surface of the left lung and there was a tuberculous nodule the size of a hazelnut in the apex of the left lower lobe; the right lung was normal. There were some shotty nodules on the parietal surface of the liver and some perihepatitis. There was no tuberculosis elsewhere. The brain was congested. A guineapig inoculated from one of the suprarenal bodies was sent to Blythwood: it was killed 76 days after inoculation and showed general tuberculosis of a chronic type.	Suprarenal body.	Through the guineapig.	Calf. Pig. Rabbit. Guineapig.	Group II.

BONE AND JOINT TUBERCULOSIS.

Designation of Virus.	Date of Receipt of Virus.	Age and Sex of Patient.	Kind of Tuberculosis.	Abstract of Case.	Cultures.		Species of Animals Tested.	Classification of Virus according to Cultural Characters and Virulence.
					Original Material.	How obtained.		
H. 67. "E.P."	May 1, 1906.	14 years Female.	Multiple tuberculosis of bones.	The patient had been frequently operated on for abscesses which had developed in various parts of her body. Pus from an abscess which had formed over the inner end of the left scapula was sent to Blythwood; no T.B. were found in a smear from it, but guineapigs inoculated with it became tuberculous.	Pus from the abscess.	Through the guineapig.	Calf. Rabbit. Guineapig. Dog.	Group II.
H. 68. "R.B."	May 1, 1906.	69 years Male.	Tuberculosis of the sacrum.	The patient was admitted to hospital on April 18 complaining of pain in the sacral region; on examination a tumour the size of an orange was found in the left buttock; it was opened on May 1. Pus was evacuated from it, and dead bone was found at the bottom. Pus and some of the lining membrane of the abscess was sent to Blythwood; ten T.B. were seen in a smear from the pus.	Pus from the abscess.	Direct.	Cow. Calf. Pig. Goat. Rabbit. Guineapig. Fowl.	Group II.
H. 72. "H.C."	Aug. 3, 1906.	49 years Male.	Tuberculosis of a rib.	The patient had had no previous illness of any importance. After a slight strain a fluctuating swelling formed over the anterior end of the 8th rib on the left side, and reached the size of a pigeon's egg. On being opened (on Aug. 3), this proved to be a cold abscess lying over a small area of carious rib. Some of the pus was sent to Blythwood, and two T.B. were found in a smear made from it. The wound did not heal, and some fever set in followed by the appearance of a second and more acute abscess; when this was opened it was found to communicate with a small cavity within the thorax. The second wound healed satisfactorily, but the first was very slow to close. There were no signs of disease in the lung, and no enlargement of the nearest glands.	Pus from the abscess.	Through the guineapig.	Calf. Rabbit. Guineapig.	Group II.

BONE AND JOINT TUBERCULOSIS—*continued.*

Designation of Virus.	Date of receipt of Virus.	Age and Sex of Patient.	Kind of Tuberculosis.	Abstract of Case.	Cultures.		Species of Animals Tested.	Classification of Virus according to Cultural Characters and Virulence.
					Original Material.	How obtained.		
H. 76. "G.M."	Jan. 15, 1908.	30 years Male.	Tuberculosis of a kneejoint.	The patient, a man aged 30 years, had always been healthy. There was no family history of tuberculosis. The present illness began eleven months ago with pain in the left kneejoint; the joint began to swell six months ago; there was no history of injury. On admission to hospital the joint was enlarged, and there was fluid in it; the synovial membrane appeared to be thickened; there was limitation of flexion, which caused pain, and of extension; there was a swelling in the substance of the inner head of the gastrocnemius, which was not accompanied by pain or tenderness. There were no physical signs in the chest. On Jan. 14, 1908, the kneejoint was excised, and the pulpy synovial membrane, together with the heads of the femur and tibia, were sent to Blythwood. An emulsion was made of some of the synovial membrane: microscopical examination showed T.B. in moderate numbers.	Synovial membrane.	Through the guineapig.	Rabbit. Guineapig. Rhesus monkey.	Group II.

PULMONARY TUBERCULOSIS.

Designation of Virus.	Date of Receipt of Virus.	Age and Sex of Patient.	Description of Tuberculosis.	Cause of Death.	Abstract of Post Mortem Notes.	Cultures.		Species of Animals Tested.	Classification of Virus according to Cultural Characters and Virulence.
						Original Material.	How obtained.		
H. 79. "J.N."	Dec. 28, 1906.	24 years Male.	Tuberculosis of the lung.	Multiple strictures of the small intestine (? tuberculous).	A portion of the base of the left lung was firm, dark-red, and airless; on section it showed a large tough caseous patch (2 cm.), a few smaller patches, and a number of small greyish tubercles. A portion of the apex of the right was crepitant but tough and slightly congested; on section it showed several fibrous tubercles and one peasized tough caseous nodule. In this portion of the lung there was a thickened bronchus plugged with caseous material (T.B. in clumps). No tubercles were seen elsewhere in the lung, or in the liver, spleen, and kidneys. The small intestine was enormously dilated in places, with many strictures, one very tight one; the walls were thickened and the peritoneal surfaces showed signs of old peritonitis. The mesenteric glands were normal. T.B. were found in several different emulsions made from the lung lesions.	Lung	Direct, and through the guineapig.	Calf. Goat. Rabbit. Guineapig. Dog. Cat.	Group II.

H. 80. **"D.M."**	Jan. 21, 1907.	33 years Male.	Tuberculosis of the lung.	Tuberculous pleurisy with effusion.	In the apex of the left lung there were two cavities (the larger 2 cm. in diameter) surrounded by fibroid tissue containing caseous nodules; the rest of the lung was crepitant and showed scattered firm dry caseous nodules up to 1 cm. with thin fibrous capsules; in the dorsal border there was a dense fibroid and caseating patch 5·5 by 2 cm. The right lung was collapsed, the diaphragmatic pleura was covered with a fibrino-purulent layer and the pleura elsewhere was rough and thickened. The apical portions of the upper and the lower lobes were fibroid and studded with caseous nodules of various sizes up to 1·5 cm. Elsewhere in the lung fairly numerous small grey tubercles and an occasional caseous nodule were seen. There was tuberculous pleurisy with great effusion on the right side. The bronchial glands were pigmented, otherwise normal. The spleen was very large and dark red; a guineapig inoculated with it became tuberculous. Other organs and glands were normal. Numerous T.B. in clumps were seen in emulsions from the lung nodules.	Lung	Direct, and through the guineapig.	Calf. Rabbit. Guineapig. Dog.	Group II.
H. 81. **"P.W."**	Jan. 29, 1907.	33 years Male.	Tuberculosis of the lung.	Phthisis	The lungs were heavy and adherent, and showed on the surfaces thin fibrino-purulent patches. The upper lobe of the right lung was consolidated and caseating, and contained several irregular cavities; the middle lobe was composed partly of solid caseating tissue, and partly of pneumonic lung tissue. The lower lobe in its upper part was pneumonic, and showed caseous patches, groups of caseous tubercles, and a few irregular cavities; lower down the lobe became less congested, and contained fewer caseous tubercles. The left lung was similar. The spleen was enlarged, soft and dark red; a guineapig inoculated with it became tuberculous. Two mesenteric glands contained each a small stony hard calcareous nodule; one ?T.B. was seen in an emulsion from one of them, but two guineapigs inoculated with the emulsion remained healthy. Other organs and glands were normal. T.B. were numerous in emulsions made from the lung, and in the pus from a lung cavity.	Lung Spleen	Direct, and through the guineapig. Through the guineapig.	Calf. Horse. Rabbit. Guineapig. Chimpanzee. Monkey. Dog. Cat. Rat. Mouse. Parrot. Fowl.	Group II.
H. 104. **"E.R."**	Feb. 11, 1908.	31 years Female.	Tuberculosis of the lungs with calcareous mesenteric glands.	Phthisis	The anterior lobe and the apical portion of the posterior lobe of the left lung were riddled with cavities large and small; the intervening lung tissue was solid and airless (pneumonic) and showed caseous patches of various sizes. The posterior part of the posterior lobe was congested and showed here and there a caseous nodule the size of a hempseed. There was a number of glands about the hilum of this lung, deeply pigmented but not otherwise abnormal. The right lung was similar. In a piece of mesentery examined at Blythwood there were four irregular stony hard calcareous nodules, the largest the size of a kidney bean. In an emulsion of the nodules two T.B. were seen. The intestines and abdominal organs were normal. A few T.B. were seen in emulsions of caseous substance from the lung, and moderately numerous T.B. in the pus from a cavity.	Lung Mesenteric gland.	Direct, and through the guineapig. Direct, and through the guineapig.	Calf. Rabbit. Guineapig. Monkey.	Group II.

SPUTUM FROM CASES OF PULMONARY TUBERCULOSIS.

Designation of Virus.	Date of Receipt.	Age and Sex of Patient.	Description of Tuberculosis.	Abstract of Case.	Cultures.		Species of Animals Tested.	Classification of Virus according to Cultural Characters and Virulence.
					Original Material.	How obtained.		
H. 118. "F.C."	Oct. 31, 1908.	50 years Female.	Tuberculosis of the lung.	The patient presented clinical signs of pulmonary tuberculosis. She had been ill for 2¼ years. Numerous tubercle bacilli were demonstrated in the sputum received for investigation.	Sputum	Through the guinea-pig.	Rabbit. Goat. Rhesus Monkey. Guinea-pig. Fowl.	Group II.
H. 119. "E.S."	Feb. 4, 1909.	22 years Male.	Tuberculosis of the lung.	The patient presented clinical signs of pulmonary tuberculosis. His illness had begun two years previously. Moderately numerous tubercle bacilli were demonstrated in the sputum received for investigation.	Sputum	Through the guinea-pig.	Rabbit. Guinea-pig.	Group II.
H. 120. "B.W."	Feb. 4, 1909.	21 years Male.	Tuberculosis of the lung.	The patient presented clinical signs of pulmonary tuberculosis. His illness had begun 1½ years previously. Numerous tubercle bacilli were demonstrated in the sputum received for investigation.	Sputum	Through the guinea-pig.	Rabbit. Guinea-pig.	Group II.
H. 121. "E.A."	Feb. 4, 1909.	23 years Male.	Tuberculosis of the lung.	The patient presented clinical signs of pulmonary tuberculosis. He had been ill for 2 years. Numerous tubercle bacilli were demonstrated in the sputum received for investigation.	Sputum	Through the guinea-pig.	Rabbit. Guinea-pig.	Group II.
H. 122. "F.P."	Feb. 4, 1909.	28 years Male.	Tuberculosis of the lung.	The patient presented clinical signs of pulmonary tuberculosis. He had been ill for seven years. Moderately numerous tubercle bacilli were demonstrated in the sputum received for investigation.	Sputum	Through the guinea-pig.	Rabbit. Guinea-pig.	Group II.
H. 123. "W.W."	Feb. 4, 1909.	17 years Male.	Tuberculosis of the lung.	The patient presented clinical signs of pulmonary tuberculosis. He had been ill for four months. Very numerous tubercle bacilli were demonstrated in the sputum received for investigation.	Sputum	Through the guinea-pig.	Rabbit. Guinea-pig.	Group II.
H. 124. "M.M."	Feb. 4, 1909.	17 years Male.	Tuberculosis of the lung.	The patient presented clinical signs of pulmonary tuberculosis. There was no definite history of the commencement of his illness. Moderately numerous tubercle bacilli were demonstrated in the sputum received for investigation.	Sputum	Through the guinea-pig.	Calf. Rabbit. Guinea-pig.	Group II.
H. 125. "A.P."	Feb. 4, 1909.	25 years Male.	Tuberculosis of the lung.	The patient presented clinical signs of pulmonary tuberculosis. His illness began thirteen months previously. Moderately numerous tubercle bacilli were demonstrated in the sputum received for investigation.	Sputum	Through the guinea-pig.	Rabbit. Guinea-pig.	Group II.
H. 126. "A.W."	Feb. 4, 1909.	16 years Male.	Tuberculosis of the lung.	The patient presented clinical signs of pulmonary tuberculosis. His illness was of fourteen months duration. No tubercle bacilli were demonstrated in the sputum received for investigation.	Sputum	Through the guinea-pig.	Rabbit. Guinea-pig.	Group II.
H. 127. "R.R." *(a)*	Feb. 11, 1909.	21 years Male.	Tuberculosis of the lung.	The patient presented clinical signs of pulmonary tuberculosis. His illness was of ten months duration. Numerous tubercle bacilli were demonstrated in the sputum received for investigation.	Sputum	Through the guinea-pig.	Calf. Rabbit. Rhesus Monkey. Guinea-pig.	Group I.

,, ,, (*b*)	April 28, 1909.	(76 days older.)		Numerous tubercle bacilli were demonstrated in the sputum received for investigation.	Sputum	Through the guinea-pig.	Rabbit. Guinea-pig.	Group I.
,, ,, (*c*)	June 8, 1909.	(117 days older.)		A moderate number of tubercle bacilli was demonstrated in the sputum received for investigation.	Sputum	Direct.	Calf. Rabbit.	Group I.
,, ,, (*d*)	June 9, 1909.	(118 days older.)		Numerous tubercle bacilli were demonstrated in the sputum received for investigation.	Sputum	Direct and through the guinea-pig.	Rabbit.	Group I.
H. 128. "D.D." (*a*)	Feb. 11, 1909.	31 years Male.	Tuberculosis of the lung.	The patient presented clinical signs of pulmonary tuberculosis. He had been ill for several months. A moderate number of tubercle bacilli were demonstrated in the sputum received for investigation.	Sputum	Through the guinea-pig.	Calf. Rabbit. Guinea-pig.	Group I.
,, ,, (*b*)	June 9, 1909.	(118 days older.)		Numerous tubercle bacilli were demonstrated in the sputum received for investigation.	Sputum	Through the guinea-pig.	Calf. Rabbit.	Group I.
H. 129. "T.M."	Feb. 11, 1909.	33 years Male.	Tuberculosis of the lung.	The patient presented clinical signs of pulmonary tuberculosis. He had been ill for four years. Numerous tubercle bacilli were demonstrated in the sputum received for investigation.	Sputum	Through the guinea-pig.	Calf. Rabbit. Guinea-pig.	Group II.
H. 130. "N.B."	Feb. 11, 1909.	26 years Male.	Tuberculosis of the lung.	The patient presented clinical signs of pulmonary tuberculosis. His illness was of sixteen months duration. Very numerous tubercle bacilli were demonstrated in the sputum received for investigation.	Sputum	Through the guinea-pig.	Rabbit. Guinea-pig.	Group II.
H. 131. "M.H."	Feb. 11, 1909.	29 years Male.	Tuberculosis of the lung.	The patient presented clinical signs of pulmonary tuberculosis. He had been ill for five years. A moderate number of tubercle bacilli was demonstrated in the sputum received for investigation.	Sputum	Through the guinea-pig.	Rabbit. Guinea-pig.	Group II.
H. 132. "O.O."	Feb. 11, 1909.	18 years Male.	Tuberculosis of the lung.	The patient presented clinical signs of pulmonary tuberculosis. He had been ill for fourteen months. Numerous tubercle bacilli were demonstrated in the sputum received for investigation.	Sputum	Through the guinea-pig.	Rabbit. Guinea-pig.	Group II.
H. 133. "P.K."	Feb. 4, 1909.	24 years Male.	Tuberculosis of the lung.	The patient presented clinical signs of pulmonary tuberculosis. His illness was of 18 months duration. No tubercle bacilli were demonstrated in the sputum received for investigation.	Sputum	Through the guinea-pig.	Calf. Rabbit. Rhesus Monkey. Guinea-pig.	Group II.
H. 134. "K.K."	Feb. 11, 1909.	20 years Male.	Tuberculosis of the lung.	The patient presented clinical signs of pulmonary tuberculosis. He had had no serious illness. Numerous tubercle bacilli were demonstrated in the sputum received for investigation.	Sputum	Through the guinea-pig.	Rabbit. Guinea-pig.	Group II.
H. 135. "E.E."	Feb. 11, 1909.	21 years Male.	Tuberculosis of the lung.	The patient presented clinical signs of pulmonary tuberculosis. He had been ill for eight months. Numerous tubercle bacilli were demonstrated in the sputum received for investigation.	Sputum	Through the guinea-pig.	Rabbit. Guinea-pig.	Group II.
H. 136. "X.B."	Feb. 19, 1909.	28 years Male.	Tuberculosis of the lung.	The patient presented clinical signs of pulmonary tuberculosis. He had been ill for fourteen months. A few tubercle bacilli were demonstrated in the sputum received for investigation.	Sputum	Through the guinea-pig.	Rabbit. Guinea-pig.	Group II.
H. 137. "O.B."	Feb. 19, 1909.	20 years Male.	Tuberculosis of the lung.	The patient presented clinical signs of pulmonary tuberculosis. His illness had begun five months previously. A moderate number of tubercle bacilli was demonstrated in the sputum received for investigation.	Sputum	Through the guinea-pig.	Rabbit. Guinea-pig.	Group II.

SPUTUM FROM CASES OF PULMONARY TUBERCULOSIS—*continued.*

Designation of Virus.	Date of receipt.	Age and Sex of Patient.	Description of Tuberculosis.	Abstract of Case.	Cultures.		Species of Animals Tested.	Classification of Virus according to Cultural Characters and Virulence.
					Original Material.	How obtained.		
H. 138. "C.C."	Feb. 19, 1909.	29 years Male.	Tuberculosis of the lung.	The patient presented clinical signs of pulmonary tuberculosis. His illness was of three years duration. Numerous tubercle bacilli were demonstrated in the sputum received for investigation.	Sputum	Through the guinea-pig,	Rabbit. Guinea-pig.	Group II
H. 139. "K.H."	Feb. 19, 1909.	23 years Male.	Tuberculosis of the lung.	The patient presented clinical signs of pulmonary tuberculosis. His illness was of about 2 years duration. A few tubercle bacilli were demonstrated in the sputum received for investigation.	Sputum	Through the guinea-pig.	Rabbit. Guinea-pig.	Group II.
H. 140. "J.J."	March 4, 1909.	22 years Female.	Tuberculosis of the lung.	The patient presented clinical signs of pulmonary tuberculosis. Her present illness was of fifteen months duration, but she had always had a "weak chest." Numerous tubercle bacilli were demonstrated in the sputum received for investigation.	Sputum	Through the guinea-pig.	Rabbit. Guinea-pig. Cat. Mouse.	Group II.
H. 141. "C.H."	Feb. 19, 1909.	25 years Male.	Tuberculosis of the lung.	The patient presented clinical signs of pulmonary tuberculosis. He had been ill for seven months. Moderately numerous tubercle bacilli were demonstrated in the sputum received for investigation.	Sputum	Through the guinea-pig.	Rabbit. Guinea-pig.	Group II.
H. 142. "Q.H."	Feb. 19, 1909.	22 years Male.	Tuberculosis of the lung.	The patient presented clinical signs of pulmonary tuberculosis. He had suffered from a winter cough for a few years. Very numerous tubercle bacilli were demonstrated in the sputum received for investigation.	Sputum	Through the guinea-pig.	Rabbit. Guinea-pig.	Group II.
H. 143. "L.L."	Feb. 19, 1909.	22 years Male.	Tuberculosis of the lung.	The patient presented clinical signs of pulmonary tuberculosis. There was no definite history of the commencement of his illness; it appeared to have begun twelve months previously. Numerous tubercle bacilli were demonstrated in the sputum received for investigation.	Sputum	Through the guinea-pig.	Calf. Rabbit. Guinea-pig. Cat. Mouse.	Group II.
H. 144. "D.B."	Feb. 19, 1909.	29 years Male.	Tuberculosis of the lung.	The patient presented clinical signs of pulmonary tuberculosis. He had been ill for about fourteen months. A moderate number of tubercle bacilli were demonstrated in the sputum received for investigation.	Sputum	Through the guinea-pig.	Rabbit. Guinea-pig. Parrot.	Group II.
H. 145. "G.W."	Feb. 19, 1909.	21 years Male.	Tuberculosis of the lung.	The patient presented clinical signs of pulmonary tuberculosis. He had been ill for over two years. A moderate number of tubercle bacilli was demonstrated in the sputum received for investigation.	Sputum	Through the guinea-pig.	Rabbit. Guinea-pig. Parrot.	Group II.
H. 147. "P.C."	Aug. 6, 1909.	39 years Female	Tuberculosis of the lung.	The patient presented clinical signs of pulmonary tuberculosis.	Sputum	Through the guinea-pig.	Rabbit. Guinea-pig.	Group II.
H. 150. "C.K."	Feb. 11, 1909.	22 years Male.	Tuberculosis of the lung.	The patient presented clinical signs of pulmonary tuberculosis. He was very ill, developed a pneumo-thorax, and died in hospital. A moderate number of tubercle bacilli was demonstrated in the sputum received for investigation.	No culture was obtained because the guinea-pigs inoculated with the sputum died of peritonitis. For the rabbit, the sputum had the virulence of a Group II. organism.			

CASES FROM WHICH THE MATERIAL, APPARENTLY TUBERCULOUS, GAVE NEGATIVE RESULTS IN GUINEAPIGS.

Designation of Virus.	Date of receipt of Virus.	Age and Sex of Patient.	Character and Site of the apparently Tuberculous Lesions.	Cause of Death.	Abstract of Post Mortem Notes.	Experiments made with the Original Material.
H. 28. "C.L." (*c*)	March 12, 1908.	5 years Male.	Caseo-calcareous inguinal glands.	— (Operation.)	The inguinal glands of a boy aged 5 years removed by operation on March 12, 1908. Left inguinal glands: there were two enlarged glands (1·8 cm. and 1·5 cm. in diameter) composed of a dry chalky-white pasty substance gritty from calcification enclosed in thin fibrous capsules, and three or four small glands which were normal on section. The right inguinal glands were normal. Microscopical examination of an emulsion made from the left inguinal glands showed four T.B.; none was seen in an emulsion of a right inguinal gland. The left inguinal glands were slightly enlarged in 1904, and subsequently became more prominent. Glands removed by operation on two previous occasions had been sent to Blythwood. In May, 1904, when 14 months old, the child was admitted to hospital suffering from painful swellings on both sides of the neck, and a swelling also in the left groin; these had been present for five months. On May 12, 1904, three caseous glands were excised from the right side of the neck. A culture was raised direct from the original material and was found to be virulent for bovines and rabbits; guineapigs inoculated with the original material became tuberculous. On August 17, 1905, 15 months later, two large softened caseous glands were excised from the left side of the neck: these had increased in size since the last operation. Guineapigs were inoculated with the fresh material and culture tubes were sown; the former did not become tuberculous and the latter remained sterile. The general health of the child is now (April, 1908) excellent.	Four guineapigs and two rabbits were inoculated with emulsions made from the left inguinal glands, and one guineapig with an emulsion of a right inguinal gland. One of the guineapigs inoculated with the left inguinal gland emulsion died in 54 days and showed no sign of tuberculosis; the other guineapigs were killed, one after 33 and three after 70 days, and found to be perfectly healthy. The two rabbits were killed after 158 days, and were also found to be healthy. Culture tubes were sown from the left inguinal glands; these remained sterile.
H. 73. "M.E."	Oct. 29, 1906.	10½ years Female.	Caseo-calcareous mesenteric glands.	Heart disease following rheumatism.	No ulcers were seen in the intestine. The mesentery contained a group of tuberculous glands: three were enlarged (up to a broad bean in size) and composed of friable caseous slightly gritty substance; the others contained nodules stony hard and calcareous for the most part, dense and caseous around the margins, and enclosed in a fibrous capsule; the largest was the size of a small pea (the calcareous portion could be shelled out and resembled an irregular stone). T.B. were numerous in emulsions made from a caseous gland and from the calcareous centre of one of the nodules. There was no tuberculosis elsewhere.	Two rabbits and one guineapig were inoculated intraperitoneally with emulsions made from the mesenteric glands; they remained healthy. Several culture tubes sown from the mesenteric glands remained sterile.
H. 94. "R.M."	Nov. 2, 1907.	21 years Female.	Calcareous mesenteric gland.	Gastric ulcer.	The intestines were normal. In one of the mesenteric glands there was an irregular calcareous nodule the size of a wheat grain; the other mesenteric glands were normal. There was a slight patch of old peritonitis (? tuberculous) on the right side, and no sign of tuberculosis elsewhere. No T.B. were seen in an emulsion made from the mesenteric gland nodule.	Three guineapigs were inoculated intraperitoneally with an emulsion of the mesenteric gland nodule; they did not develop tuberculosis. Culture tubes were sown; no growth resulted.

CASES FROM WHICH THE MATERIAL, APPARENTLY TUBERCULOUS, GAVE NEGATIVE RESULTS IN GUINEAPIGS—*continued.*

Designation of Virus.	Date of receipt of Virus.	Age and Sex of Patient.	Character and Site of the apparently Tuberculous Lesions.	Cause of Death.	Abstract of Post Mortem Notes.	Experiments made with the Original Material.
H. 95. "B.C."	Nov. 27, 1907.	49 years Female.	Calcareous mesenteric glands.	Carcinoma of the bladder.	The intestines were normal. Two of the mesenteric glands were enlarged, stony hard and calcareous throughout, being with difficulty ground to powder in a mortar. No T.B. could be found in an emulsion made of them (three films were examined). There was no sign of tuberculosis elsewhere.	Three guineapigs were inoculated intraperitoneally with an emulsion of the calcareous glands; they did not develop tuberculosis.
H. 96. 'E.H.'	Dec. 10, 1907.	42 years Male.	Calcareous mesenteric glands.	Aortic aneurism.	The intestines were normal. Two mesenteric glands contained each a hard calcareous nodule, the larger about 1 cm. in diameter. No T.B. were seen in an emulsion made from the nodules. The apex of the right lung was darkly pigmented, dense, and sank in water (smear—no T.B.); the lung was otherwise normal. The left lung was extensively consolidated. The bronchial glands were enormously enlarged and pigmented. Other organs and glands were normal.	Two guineapigs were inoculated with an emulsion of the mesenteric glands; one died of acute peritonitis, the other was free from tuberculosis when killed after two months. A guineapig inoculated with an emulsion made from the right lung remained healthy.
H. 97. "E.B."	Jan. 8, 1908.	90 years Female.	Calcareous mesenteric glands.	Syncope	The intestines were normal. The mesentery contained three stony hard calcareous nodules, the largest 2 cm. in diameter. There was no sign of tuberculosis elsewhere. No T.B. were seen in an emulsion made from one of the nodules.	Three guineapigs were inoculated with an emulsion of the mesenteric gland nodule; they were free from tuberculosis when killed two months later.
H. 116. "B.F."	June 23, 1908.	20 years Male.	Calcified mesenteric gland.	Malignant endocarditis.	The intestines were not examined. In the mesentery there was one hard completely calcified gland 1 cm. in diameter; the other glands appeared enlarged but were not otherwise abnormal. There was no sign of tuberculosis in the other glands and organs of the body. No T.B. were seen in an emulsion made from the gland.	Two guineapigs were inoculated with an emulsion of the calcified mesenteric gland; they were free from tuberculosis when killed two months later.

EXAMINATION OF MILK AND SPUTUM FROM NURSING WOMEN WITH CLINICAL SIGNS OF PULMONARY TUBERCULOSIS.

Designation of Case.	Date of Receipt of Material.	Age.	History of Case.	Experiments with Milk.	Experiments with Sputum.
H. 146. "N.F."	July 10, 1909 July 29, 1909	33 years	The patient was a married woman who presented clinical signs of pulmonary tuberculosis. Her illness was of some years' duration. Her last child was born 13 days before the milk was first collected for examination. She had had five children previously: one of them was stated to have died of "consumptive bowels."	Six guinea-pigs were inoculated with the milk received on July 10, and two with that received on July 29. None of the guinea-pigs developed tuberculosis. Both milks were examined microscopically; no tubercle bacilli were demonstrated in either.	Three guinea-pigs were inoculated with centrifuged deposit of the sputum received on July 10, and two were inoculated each with a small quantity of the sputum received on July 29. None of the guinea-pigs developed tuberculosis. Smear preparations were made from the sputa; no tubercle bacilli were demonstrated on either occasion.

H. 147.	"P.C."	August 6, 1909 September 20, 21, and 22, 1909.	39 years	The patient was a married woman who presented clinical signs of pulmonary tuberculosis. Her last child was born 26 days before her milk was first collected and died subsequently of "consumptive bowels." The woman had previously had seven children, four of whom were dead; the causes of death could not be verified, but the children were stated to be "weakly."	Milk was received on four occasions, and from four to eight guinea-pigs were inoculated on each occasion. All the guinea-pigs (20 in number) were killed after periods varying from 38 to 76 days, and found healthy. No tubercle bacilli were seen in smear preparations made from the milks.	Sputum was received on one occasion only (on Aug. 6). Two guinea-pigs inoculated with it developed tuberculosis; no tubercle bacilli were seen in a smear preparation made from the sputum. (For result of investigation of this virus, *see* Table, page 102.)
H. 148.	"P.B."	August 11, 1909	26 years	The patient was a married woman who presented clinical signs of pulmonary tuberculosis: the duration of her illness was uncertain. She was confined on March 8, 1909, five months before her milk was collected for examination. She had had four children previously, three of whom died young of "convulsions," and has since had another child (May 5, 1910) who died of "consumption" four months later. The baby born on March 8 is still (Jan. 1911) alive.	Four guinea-pigs were inoculated with the milk; all were healthy when killed after 7½ weeks. A smear preparation made from the milk showed no tubercle bacilli.	Two guinea-pigs were inoculated with the sputum; they were healthy when killed after 7½ weeks. A smear preparation made from the sputum showed no tubercle bacilli.
H. 149.	"N.C."	August 18, 1909	36 years	The patient was a married woman who presented clinical signs of pulmonary tuberculosis: her illness was of some years' duration. Her last child was born shortly before her milk was collected for examination. She had had ten children previously. five of whom were dead, the causes of death being uncertain.	Four guinea-pigs were inoculated with the milk; none developed tuberculosis. Microscopical examination of the milk showed no tubercle bacilli.	Two guinea-pigs were inoculated with the sputum; one died prematurely, the other was healthy when killed after 7 weeks. Microscopical examination of the sputum showed no tubercle bacilli, but a number of acid-fast bacilli resembling the bacilli found in cows milk.

DETAILED HISTORY OF EACH CASE AND SUMMARIES OF EXPERIMENTAL RESULTS.

In the post-mortem notes of the patients from whom the tuberculous material was obtained, the asterisk (†) indicates that the notes which follow were made at the post-mortem examination.

Paragraphs not preceded by an asterisk are notes made at Blythwood of the material received.

VIRUS H. 28. "C.L."

ENLARGED CERVICAL AND INGUINAL GLANDS.

First Investigation.*

FIRST OPERATION, MAY 12, 1904.

Original material—Two caseous cervical glands from the right side of the neck.

HISTORY OF PATIENT.

The patient, a male child aged 1 year and 2 months, was admitted to hospital on May 9, 1904, suffering from enlarged cervical glands.

On admission swellings were found on both sides of the neck and in the left groin. It was stated that all these swellings had been present for the past five months. The neck was becoming painful.

The previous history of the child was somewhat indefinite. He had always been artificially fed from birth.

Family history.—There was a history of phthisis on the mother's side, her father having suffered from consumption. The mother herself before marriage suffered from cough and occasional haemoptysis.

Operation.—On May 12, 1904, the glands on the right side of the neck were excised, and were found to be breaking down.

The wound had healed when the child was discharged from hospital.

History of patient subsequent to the first operation.—The child was seen again on October 1, 1904. The wound on the right side of the neck had quite healed. The child looked anaemic and unhealthy. On the left side of the neck there were some enlarged glands, and small swellings could also be detected in both axillae and both groins. There also appeared to be an indistinct tumour or swelling in the region of the umbilicus. The mother stated that the child suffered from constant diarrhœa and occasional vomiting and was not so well as when he left the hospital. She also stated that he suffered occasionally from choking fits, which were relieved by coughing up blood. The haemorrhage, however, appeared to be due to some ulcers in the mouth which caused the mucus at times to appear bloodstained.

On November 23, 1904, the child was again seen. He had considerably improved since the last visit six weeks previously; he looked more healthy and had evidently put on flesh. The wound on the right side of the neck was quite sound but the glands on the left side were still enlarged. The glands in the axillae and groins could still be detected, but no umbilical tumour could be felt. The mother stated that the child took food well, that it occasionally had diarrhœa but not so frequently as before, and that there was still occasional bloodstained expectoration.

On July 31, 1905, the child was again seen. He was distinctly better in every way and appeared well nourished, but the glands on the left side of the neck had increased in size and a chain of smaller glands could be felt in connection with the large ones. The inguinal glands had also become larger. There was a small ulcer on the right cornea.

DESCRIPTION OF CERVICAL GLANDS RECEIVED AT BLYTHWOOD ON MAY 12, 1904.

Three glands were received, each about the size of a rather small gooseberry, consisting of partly caseous and partly gelatinous tissue. Two of the glands had cavities in the interior containing turbid fluid. On microscopical examination short tubercle bacilli were found in the caseous matter but they were not present in large numbers.

Two guinea-pigs were inoculated with an emulsion made from the glands.

CULTURES.

A culture obtained direct from a cervical gland was found by Drs. Cobbett and Eastwood to grow with great difficulty on all media containing glycerin (Grade I).

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guinea-pigs.—Two guinea-pigs, Nos. 1270 and 1271, were inoculated intraperitoneally with the original material; one died in 48 days, the other was killed after 48 days; both showed general tuberculosis.

(An emulsion was made from the tuberculous tissues of these guinea-pigs and inoculated into two calves subcutaneously in doses estimated to contain nearly 1000 million tubercle bacilli. These calves, Nos. 513 and 515, died in 25 and 44 days respectively of severe general tuberculosis. Two rabbits inoculated with the same emulsion, one intraperitoneally and one intravenously, died of general tuberculosis in 21 and 14 days respectively.)

(*b*) With culture.

Calves.—Four calves were inoculated with culture derived from the human cervical glands direct.

One, No. 489, received 50·0 milligrammes, another, No. 469, 43·0 mg. and two, Nos. 813 and 815, 10·0 mg. each. They died, or were killed when dying, after 28, 29, 39, and 48 days respectively and all showed severe general tuberculosis.

Rabbits.—Three rabbits were inoculated intraperitoneally with various doses of the same culture; all died of general tuberculosis in from 36 to 40 days.

Guinea-pigs.—Four guinea-pigs were inoculated intraperitoneally with various doses; all died of general tuberculosis in from 13 to 31 days.

Rat.—One rat received 100·0 mg. of culture and died 33 days later; tubercle bacilli were numerous in the organs; there were no visible lesions.

Second Investigation.*

SECOND OPERATION, AUGUST 17, 1905.

Original material—Two caseous cervical glands from the left side of the neck.

HISTORY OF PATIENT (*continued*).

In August, 1905, the child, then aged 2 years 5 months, was readmitted to hospital; and on August 17, 15 months after the first operation, the enlarged glands on the left side of the neck were removed by operation.

DESCRIPTION OF CERVICAL GLANDS RECEIVED AT BLYTHWOOD ON AUGUST 17, 1905.

Two glands, of the size of large gooseberries (bigger than those received in 1904), containing white softened caseous matter of the consistency and appearance of Devonshire cream.

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* *See* Volume II. of Appendix to the Second Interim Report, pages 619–647.

Microscopical examination of the caseous matter showed short tubercle bacilli not in large numbers.

Experiments with the original material.

Culture tubes were sown with the caseous matter, but remained sterile.

Guinea-pigs.—Two guinea-pigs were inoculated with an emulsion made from the glands. Both were killed, one after 25 days, the other after 60 days, and were found to be free from tuberculosis.

Third Investigation.

Third Operation, March 12, 1908.

Original material—The right and left inguinal glands.

HISTORY OF PATIENT (*continued*).

In March, 1908, the child, then aged 5 years, was readmitted to hospital, and the glands in the right and the left groins were removed by operation on March 12.

The general health of the patient was then excellent, and the lungs were sound.

DESCRIPTION OF INGUINAL GLANDS RECEIVED AT BLYTHWOOD ON MARCH 12, 1908.

Left Inguinal Glands.—Two were enlarged and nodular in outline; one measured 1·8 cm. the other 1·5 cm. in greatest diameter; on section they were composed practically throughout of a dry chalky-white pasty substance, gritty from calcification, which readily emulsified, forming a milky-white fluid. The caseous substance was surrounded by thin fibrous capsules, which here and there sent inwards trabeculæ. Besides these two enlarged glands there were three or four small ones, which were normal on section.

Right Inguinal Glands.—Normal.

Experiments with the original material.

Three separate emulsions were made from the two affected left inguinal glands, and cultures were sown and animals inoculated from each. Microscopical examinations of a smear preparation from one of these emulsions showed four tubercle bacilli.

Guinea-pigs.—Four guinea-pigs were inoculated intraperitoneally with one or other of these emulsions. One died after 54 days and showed no tuberculosis and no obvious cause of death; the others were killed after 33, 70, and 70 days and found to be perfectly healthy.

Rabbits.—Two rabbits were inoculated, one intravenously and one subcutaneously, with one of the emulsions. They were killed 158 days later and found to be perfectly healthy.

Cultures.—All the culture tubes sown remained sterile.

An emulsion was also made from one of the normal right inguinal glands and inoculated into a guinea-pig. The guinea-pig was killed after 70 days and found to be healthy.

SUMMARY.

From a child aged 14 months enlarged and caseous cervical glands were removed from the right side of the neck.

A culture isolated direct from one of these glands was identical with bovine tubercle bacilli in its cultural characters and virulence for the calf and rabbit.

At the time of the removal of the right cervical glands enlarged glands were noticed in the left cervical and and left inguinal regions; these were removed 15 months and 3 years 10 months later respectively, the child being 2 years 5 months old at the time of the second and 5 years old at the time of the third operation.

The left cervical glands were large soft and caseous; the left inguinal glands were enlarged caseous and gritty from calcification.

No tuberculosis was produced in guinea-pigs inoculated with emulsions made from either of these two groups of glands, though tubercle bacilli were demonstrated on both occasions.

The health of the child, which had been very poor at the time of the first operation and for several months after, gradually improved; and at the time of the third operation the child was quite well and healthy-looking.

VIRUS H. 60. "W.B."

GENERAL MILIARY TUBERCULOSIS OF UNCERTAIN ORIGIN.

Original material—The specimens received at Blythwood were the bronchial and the mesenteric glands, a portion of lung and of the meninges of the brain.

HISTORY OF PATIENT.

The patient, a boy aged four years and seven months, was admitted to hospital on January 9, 1906.

There was no family history obtainable.

The child had had measles at three years nine months followed by whooping cough.

He was drowsy for two months at the commencement of the present illness; he then had a fall and the drowsiness became more marked. On December 11, 1905, the child was hit by a swinging gate on the head, but was none the worse for it at first; on December 26 he vomited and was put to bed; the vomiting continued on January 4, 1906. Squint of the left eye was noticed.

On admission the child's face was flushed: he could not be roused: the legs were drawn up and arms crossed over the chest. The head was not retracted: the neck and limbs were rigid: there was tremor of the right arm. The eyelids were apart and there was a divergent squint, and slight optic neuritis of the left eye. Nothing abnormal was found in the lungs. Picking of lips and champing of the teeth was noticed: there was Kering's sign on both sides: the abdomen was carinated.

The child died on the following day, January 11, 1906.

POST-MORTEM NOTES AND DESCRIPTION OF MATERIAL RECEIVED AT BLYTHWOOD.

Lungs.—Fairly numerous miliary tubercles (the largest 1·5 mm. in diameter) were seen in the portion of lung sent, ten being counted in a square inch; the tubercles were grey at the margins and yellow at the centres.

†The entire lung was similarly studded with miliary tubercles.

†*Pleura.*—The pleura was studded with tubercle

Bronchial Glands.—The bronchial glands, three in number, were probably enlarged. One measured 2·5 by 1·3 cm., the second 1·3 by 1·3 cm., and the third was the size of a French bean.

On section they were firm, yellow in colour, and slightly pigmented, and composed of dense fibrous tissue with caseous foci.

†*Peritoneum.*—The peritoneum was studded with tubercle in patches, and these extended right into the iliac fossae.

There was peritonitis on the left side.

†*Intestines.*—There were numerous tubercles in the ileum, and one or two ulcers at the end of the ileum.

Mesenteric Glands.—The mesenteric glands were swollen, soft, and pink in colour; in their cortices were fibro-caseous tubercles, two or three in each gland, the largest about 0·3 cm. in diameter.

Coeliac Glands.—There were also two large glands each measuring about 2·5 by 1·9 cm. which had apparently been cut off from the coeliac end of the mesentery.

These glands were packed with yellow fibro-caseous tubercles in many places confluent one with another, so that there was practically no gland tissue remaining. The lesions in the coeliac glands however appeared less advanced than those in the bronchial glands.

†*Liver.*—The liver was studded with numerous tubercles.

†*Spleen.*—The spleen was studded with numerous tubercles.

†*Kidneys.*—The kidneys showed some miliary tubercles.

Meninges of Brain.—A few little tubercles were with difficulty seen on the small portion of meninges examined at Blythwood; no tubercles were seen in the piece of brain to which it was attached.

The post-mortem notes describe the meninges as being "studded with grey tubercles."

†*Bones and Joints.*—Healthy.

†There were no scars in the neck.

Microscopical Examinations.

Tubercle from the Lung—No tubercle bacilli seen.

Emulsion of the Lung.—No tubercle bacilli seen. Other micro-organisms.

Caseous Material from a Bronchial Gland.—Two tubercle bacilli seen.

Tubercle from the Meninges.—Two tubercle bacilli seen.

Emulsion of the Meninges.—Tubercle bacilli; few seen.

Emulsion of the Mesenteric and Coeliac Glands.—(1st smear.) No tubercle bacilli seen. (2nd smear.) Five tubercle bacilli seen.

Two guinea-pigs were inoculated with each of four emulsions: *i.e.* of lung, of meninges, of bronchial glands, and of mesenteric and coeliac glands.

CULTURES.

Cultures were obtained from the bronchial glands, the mesenteric glands, the lung and the meninges, in each case through the guinea-pig.

Dr. Cobbett tested all the strains on the differential media shortly after their isolation and found that they grew well, the strain from the bronchial gland growing as well as the others.

Dr. Eastwood has placed the bronchial gland strain in his Grade III, and the three other strains in his Grade IV.

The strains were tested by me in November and December 1906, *i.e.* after they had been in cultivation about nine months.

All the strains grew well on the differential media, their cultural characters being practically identical.

INOCULATION EXPERIMENTS.

(These inoculations were made by Dr. Cobbett.)

(*a*) With the original material.

Guinea-pigs 1825 and 1826 were inoculated intraperitoneally with an emulsion made from the bronchial glands. The former died in 82 days, the latter was killed after 131 days; both showed general tuberculosis.

Guinea-pigs 1827 and 1828 were inculated with an emulsion made from the lung, 1829 and 1830 with an emulsion made from the mesenteric and coeliac glands, and 1831 and 1832 with an emulsion made from the meninges, all intraperitoneal; 1827 was killed after 70 days and showed slight tuberculosis, 1829 after 68 days and showed general tuberculosis. The remaining four guinea-pigs died of general tuberculosis in periods varying from 39 to 91 days.

(*b*) With culture.

Calves.—Three calves were inoculated subcutaneously with culture derived from the bronchial glands through Guinea-pig 1825.

No. 1099 which received 50·0 mg. was killed when dying after 28 days, Nos. 1107 and 1109 which received 10·0 mg. died in 58 and 32 days respectively; all had severe general tuberculosis.

Two calves. Nos. 1049 and 1053, were inoculated subcutaneously, one with 50·0 mg. of culture derived from the mesenteric glands through Guinea-pig 1829, the other with 650·0 mg. of culture derived from the mesenteric glands through Guinea-pig 1830. No. 1049 was killed after 94 days and showed tuberculosis limited to the site of inoculation and the adjacent gland; No. 1053 was killed after 95 days and showed a large thin-walled cyst at the seat of inoculation, fibro-calcareous nodules in the prescapular gland, a fibrous nodule with a little caseous centre and several minute translucent tubercles in the lungs, and one or two small caseous tubercles in the right ischiatic, both popliteal, and several mesenteric glands.

Two calves, Nos. 989 and 995, were inoculated subcutaneously, each with 50·0 mg. of culture derived from the meninges through Guinea-pig 1832. The former was killed after 91 days and showed a tumour of moderate size at the seat of inoculation, fibro-calcareous nodules in the prescapular gland, a fibro-calcareous nodule ($\frac{1}{3}$ in.), and three minute tubercles in the lung. The latter was killed after 92 days and showed a small local lesion with a scar on the surface, two fibro-calcareous nodules in the prescapular gland, and a few minute calcareous specks in the thoracic and mesenteric glands.

One calf, No. 1081, was inoculated subcutaneously with 50·0 mg. of culture derived from the lung through Guinea-pig 1827. It was killed after 90 days and showed a cyst at the seat of inoculation, a prescapular gland almost entirely calcareous; a small number of grey tubercles with yellow centres, and one fibro-calcareous nodule (2 by 0·7 cm.) in the lungs; two tubercles in the spleen, ten in the liver, and one or two in a thoracic, a renal, the lumbar, two portal and one precrural glands.

Rabbits.—Two series of rabbits, seven in all, were inoculated intraperitoneally with various doses (from 10·0 to 0·01 mg.) of culture derived from the bronchial gland through Guinea-pig 1825. One (0·1 mg) died after 83 days and showed chronic progressive tuberculosis, the injection having probably been subcutaneous to a slight extent; another (also 0·1 mg.) was killed when ill after 118 days and showed chronic general tuberculosis. The remaining five rabbits died of general tuberculosis in periods varying from 28 to 96 days.

Three rabbits were inoculated intraperitoneally with varying doses (up to 10·0 mg.) of culture derived from the mesenteric glands through Guinea-pig 1829. All were killed after 98 days and showed slight chronic tuberculosis.

Two rabbits were inoculated intraperitoneally with 10·0 mg. and 1·0 mg. of culture derived from the meninges through Guinea-pig 1832. Both were killed after 92 days and showed slight tuberculous peritonitis; in one there was also a single tubercle in the right kidney.

Two rabbits were inoculated intraperitoneally with 10·0 mg. and 1·0 mg. of culture derived from the lung through Guinea-pig 1827. One died after 45 days and showed slight tuberculous peritonitis, the cause of death not being ascertained; the other was killed after 107 days and showed slight tuberculosis of the peritoneum only.

Rhesus Monkeys.—Three monkeys, Nos. 83, 81, and 79, were fed with the culture derived from the mesenteric glands, the doses being 1·0 mg., 1·0 mg., and 0·1 mg. All died of general tuberculosis, after 56, 50, and 84 days respectively.

SUMMARY.

A case of general miliary tuberculosis of uncertain origin in a child aged 4 years 7 months.

Cultures were obtained from the mesenteric glands, lung, meninges, and bronchial glands, in each case through the guinea-pig.

All the strains grow luxuriantly on the differential media, their cultural characters being practically identical.

The strains derived from the mesenteric gland, lung, and meninges are slightly virulent for calves and rabbits; that derived from the bronchial gland is virulent for these animals. (The latter strain was demonstrated to be a mixture of human and bovine tubercle bacilli.)

VIRUS H. 67. "E.P."

MULTIPLE TUBERCULOSIS OF BONES.

Original material—The material sent was pus from an abscess over the left scapula.

HISTORY OF PATIENT.

The patient from whom the material was obtained was a girl aged 14, who had been frequently operated on for abscesses which had developed in various parts of her body.

She first came under observation in April 1902, at the age of 10, when she was sent to an infirmary from a children's hospital.

On admission to the infirmary the right side of her face was swollen and hard. There was a scar on the right zygonia, and a discharging sinus behind the right angle of the jaw, and one in the middle line of the lower jaw. The left side of the neck was covered with scars, and enlarged glands could be felt in this region. There was necrosis of the left tibia at the junction of the middle and lower thirds with a sinus on the inner side. On the outer side there were unhealthy scabs.

There was impaired note in both supra-spinous fossae with creaking respiration.

On August 20th, 1902, a fluctuating abscess in the right foot was opened and dead bone scraped away.

Ten days later an abscess in the neck was opened and caseous matter and pus removed.

January 19th, 1903. The foot was at this date almost healed; the jaw was in the same condition, but a large carious tooth had come away.

On March 30th the child's condition was satisfactory (weight 4 st. 7 lb.), and eventually, on July 8th, she was sent to a seaside convalescent home.

On May 20th, 1904, the patient was readmitted to the infirmary because she had been kicked on the previously diseased skin of the left tibia. There was a small ulcer, the base of which was adherent to the tibia. A few days later purulent blisters and outlying nodules had formed on the skin.

On April 11th, 1905, a sinus in the chin was scraped; 42 days later the sinus was closed.

On October 17th, 1905, a swelling situated on the inner side of the left thigh was incised and pus let out.

On February 1st, 1906, the lesion in the thigh was scraped, and a quantity of tuberculous tissue removed.

On March 23rd a fluctuating swelling behind the lower third of the left leg between the tendon Achillis and deep muscles was incised, and pus was let out.

On April 27th there was a fluctuating swelling on the left shoulder the size of a hen's egg, moveable, red, attached to the skin. On May 1st, 1906, this abscess was incised, but no dead bone could be felt.

The pus from the abscess was sent to Blythwood, and two guinea-pigs were inoculated with it. It was examined microscopically, but no tubercle bacilli were found in it.

On August 25th, 1906, the patient was again sent to a convalescent home.

CULTURES.

A culture was obtained from each of the two guinea-pigs inoculated with the original material, growth being very luxuriant in each case on glycerin-serum.

In subculture the organism grows well on the differential media.

On glycerin-serum the growth was much more abundant than on serum.

On glycerin-agar growth was luxuriant, the surface being covered in a fortnight with a wrinkled slightly pigmented layer, which quickly became creamy yellow, very thick, and highly convoluted.

On potato a thick yellow wrinkled and warty growth was soon formed.

On broth growth was very abundant, the whole surface of a 6oz. medicine bottle finally becoming covered with a thick yellow wrinkled and warty membrane.

INOCULATION EXPERIMENTS.

(*a*) With the original material

Guinea-pigs.—Two guinea-pigs (1914–1915) were inoculated intraperitoneally with the pus; they died in 70 and 77 days respectively and showed general tuberculosis of a chronic type.

(*b*) With culture.

Calves.—Two calves (Nos. 1169 and 1173) were inoculated subcutaneously with culture derived from Guinea-pig 1914, each receiving 50·0 milligrammes.

Calf 1169 was killed in good health 90 days after inoculation and showed a cyst with fibrous walls and caseo-purulent contents at the site of inoculation, an enlarged and extensively caseous prescapular gland, sparsely scattered tubercles in the lungs, and one or more small caseous or calcareous tubercles in most of the lymphatic glands of the body.

Calf 1173 also remained in good health throughout the experiment, and when killed 137 days after inoculation showed a cyst with fibrous walls and caseo-purulent contents at the site of inoculation, and a small caseous nodule and a few calcareous tubercles in the prescapular gland.

Rabbits.—A series of rabbits was inoculated (two intravenously, two intraperitoneally, and two subcutaneously) with varying doses of culture at the same time as the calves. One intravenous rabbit (dose 1·0 mg.) died in 113 days and showed chronic general tuberculosis, not apparently severe enough to account for death. The others were killed after 126 days, and showed chronic retrogressive tuberculosis.

Guinea-pigs.—Four guinea-pigs were inoculated, two subcutaneously and two intraperitoneally, with the culture derived from guinea-pig 1914 (doses 1·0 and 0·1 mg.); all died of general tuberculosis in periods varying from 24 to 165 days.

SUMMARY.

From a case of multiple tuberculosis of bones in a girl aged 14 years a culture was obtained which grows luxuriantly on all media containing glycerin, is virulent for guinea-pigs, and only slightly virulent for calves and rabbits.

Virulence after Passage.

The virulence of this virus was unchanged after a residence of 460 days in the body of the calf (four calves).

VIRUS H. 68. "R.B."

TUBERCULOSIS OF THE SACRUM.

Original material—The material sent was pus and some of the lining membrane of a sacral abscess.

HISTORY OF PATIENT AND DESCRIPTION OF MATERIAL RECEIVED AT BLYTHWOOD.

The patient was a man aged 69. He had had "congestion of the lungs" and two attacks of pleurisy with effusion 2½ years previously.

On admission to hospital on April 18, 1906, he complained of pain in the sacral region, which was not increased by pressure or on walking; slight redness was noticed over the lower left sacral and coccygeal regions. Nothing could be felt per rectum. There was harsh breathing at the left apex, and crepitations at the left base.

Two days later a mass the size of an orange was felt in the left buttock; it was fluctuant, freely moveable, not tender, and was attached to the deep structures, but not to the skin.

On May 1, 1906, the tumour was opened. Pus was evacuated from it and dead bone was found at the bottom. The sacrum was scraped and the wound sewn up.

Pus and some of the lining membrane of the abscess was sent to Blythwood; the pus was emulsified and injected into two guinea-pigs. A smear from it was examined microscopically, and ten tubercle bacilli were found.

CULTURES.

A culture was obtained direct from the original material, numerous opaque white raised colonies developing on a glycerin-serum tube; no colonies appeared on any of the serum tubes inoculated with the pus.

After subculture for eight generations on serum the culture was tested on the differential media.

On glycerin-serum the growth was moderately abundant and showed raised opaque white ridges and patches, whereas on the same serum without glycerin only a thin uniform grey layer was produced.

On glycerin agar a thick creamy wrinkled layer was formed.

On potato growth was moderately thick warty and slightly pigmented.

The whole surface of a bottle of broth was covered in three weeks with a thick opaque whitish growth, yellowish and wrinkled near the serum.

On the gelatin medium growth was slower than on broth, but eventually the whole surface was nearly covered with a fairly thick opaque whitish or creamy growth showing slight wrinkling.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Two guinea-pigs, 1916 and 1917, were inoculated intraperitoneally; they died of general tuberculosis in 101 and 106 days respectively.

(*b*) With culture.

Bovines.—One cow and two calves were inoculated subcutaneously with culture derived from the original material.

Cow 77 received 100·0 mg.; she remained in good health, and when killed 156 days later was found to have a minimal local lesion and a small caseo-purulent nodule in the prescapular gland. The milk of the cow caused tuberculosis in many guinea-pigs inoculated with it at varying periods during the experiment (seeReport on the excretion of tubercle bacilli in milk), but no tuberculous lesions were found in the udder.

Calves 1161 and 1167 received 100·0 and 50·0 mg. respectively, and were killed when in good health 91 and 92 days after inoculation.

The former had a small local lesion, caseous nodules in the prescapular gland, a prepectoral gland fibro-caseo-calcareous throughout, and a few grey tubercles in the lungs; the mesenteric and ileo-colic glands showed calcareous tubercles, and there were some minute foci in the thoracic glands.

The latter showed a cystic local tumour, softened caseous and slightly calcareous nodules in the prescapular gland, and one or two minute tubercles in the lungs, one suprarenal, two thoracic glands, and one lumbar gland.

Rabbits.—Six rabbits were inoculated, two intravenously, two intraperitoneally, and two subcutaneously, with varying doses of culture derived from the original material. One died in 10 days of causes other than tuberculosis, a second, inoculated intravenously with 1·0 mg., died in 43 days of general tuberculosis. The remaining four were killed after 124 days and showed chronic tuberculosis of the type usual with viruses of group II.

Guinea-pigs.—Four guinea-pigs were inoculated with the same culture, two intraperitoneally and two subcutaneously in doses of 1·0 and 0·1 mg. All died of general tuberculosis in from 39 to 98 days.

Fowls.—Three fowls, Nos. 14, 15, 16, were intravenously inoculated with 1·0, 10·0 and 50·0 mg. of culture respectively. All three were killed after 90 days; the two former were healthy throughout, the latter, which received 50·0 mg., had three tubercles in the lungs, and no lesions elsewhere.

Goat and Pigs.—One goat and four pigs were fed with varying doses of culture derived from the original material. The animals remained well and were killed in good condition in periods varying from 93 to 378 days. The tuberculosis in the goat was limited to the glands along the alimentary tract and was retrogressive; in the pigs there were besides a few disseminated lesions situated chiefly in the lungs.

SUMMARY.

From a case of tuberculous osteitis of the sacrum in a man aged 69 a culture was isolated which grows luxuriantly on all media containing glycerin and has only slight virulence for the ox, goat, pig and rabbit; all the guinea-pigs inoculated died of general tuberculosis.

Virulence after Passage.

The virulence of this virus was unchanged after a residence of 506 days in the body of the calf (five calves).

VIRUS H. 69. "F.K."

PRIMARY ABDOMINAL TUBERCULOSIS.

Original material—The specimens sent were a portion of the brain and the mesenteric glands.

HISTORY OF PATIENT.

The patient was a girl aged two years, who was admitted to hospital on May 4, 1906, suffering from meningitis. There was no direct history of tuberculosis in the family, but the father and mother suffered from chest troubles, and another of their children had enlarged glands in the neck.

The patient had had measles when eight months old, and diarrhœa and vomiting at 12 months. Five weeks previous to admission she suffered from double otorrhœa, and was said to have had a blow on the head at about the same period. Three weeks before admission the child became sleepy and feverish, and had a fit; subsequently she was irritable and drowsy. During the last four days she has appeared worn and ill-looking.

On admission the child was pale, well nourished, stupid and irritable if roused. Pulse slow and irregular; chest resonant, no adventitious sound; abdomen normal.

She got gradually worse, and died on May 12, 1906, eight days after admission.

POST-MORTEM NOTES AND DESCRIPTION OF TISSUES RECEIVED AT BLYTHWOOD.

Brain.—Numerous grey tubercles were seen, between 1 and 2 mm. in diameter, lying along the vessels of the pia mater. No tubercle bacilli were seen in an emulsion of the meninges.

† Some small ulcerations were seen in the *ileum.* In the *mesentery* there was a tuberculous gland the size of a large bean with cream-coloured caseous contents, easily broken down when scraped with a knife. Tubercle bacilli were seen in an emulsion from this gland.

† There was slight tuberculous perisplenitis; no tubercles were seen elsewhere on the *peritoneum*, or in the *spleen* substance.

† All other organs and glands were found to be normal.

Three guinea-pigs were inoculated with an emulsion of the mesenteric gland, and three with an emulsion of the meninges.

CULTURES.

Cultures were obtained from the mesenteric gland and the meninges, in each case through the guinea-pig.

In the case of the mesenteric gland the culture was derived from a guinea-pig which had been inoculated with an emulsion of tuberculous tissue from one of the guinea-pigs inoculated with the original material.

In subculture the two strains have identical characters on the differential media.

On serum for many generations rather thin uniform grey glazed layers were produced.

On glycerin serum growth was better than on serum alone, and exhibited moist opaque white patches and streaks.

Growth on glycerin agar varied in character on different tubes; on some tubes dry greyish white patches were seen at the end of the first and second weeks and in these, and on the surface of the medium generally, discrete colonies subsequently developed which finally attained some size, becoming creamy and nodular; on other tubes no growth occurred during the first few weeks; then discrete colonies made their appearance and eventually the surface was covered with raised opaque yellow colonies, confluent in places and often surrounded by a filmy grey margin.

On potato a thin grey layer was seen at the end of the first week, and in this raised colonies slowly developed.

The surface of broth was quickly covered with a thin grey membrane, containing slightly thicker patches, which in one case showed a tendency to break up and sink.

On gelatin growth did not so readily take place, and on several bottles after many weeks the surface was only partly covered with patches composed of warty yellow nodules loosely held together by thin grey growth.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Three guinea-pigs (1918–1920) were inoculated intraperitoneally with an emulsion made from the mesenteric gland, and three (1923–1925) with an emulsion of the meninges. Two died, four were killed at varying periods; all showed general tuberculosis.

(*b*) With culture.

Calves.—One calf, No. 1267, was inoculated subcutaneously with culture derived from the meninges through G.P. 1924, and one, No. 1249, with culture derived from the mesenteric gland through G.P. 1962, the dose in each case being 50·0 mg.

Calf 1267 died in 56 days and showed severe general tuberculosis.

Calf 1249 was killed when in moderately good health after 101 days and showed general progressive tuberculosis of moderate severity.

Rabbits.—Two series of six rabbits each were inoculated, one series with the culture from the meninges through G.P. 1924, the other with a culture from the mesenteric gland through G.P. 1962. In each series two rabbits were inoculated intravenously (doses 1·0 and 0·1 mg.), two intraperitoneally (doses 1·0 and 0·1 mg.), and two subcutaneously (doses 10·0 and 1·0 mg.). One intravenous rabbit from the first series died in six days and showed early tuberculosis of lungs; and one intravenous rabbit from the second series died in four days from some unascertained cause. All the other rabbits died of general tuberculosis, the duration of life varying from 16 to 92 days.

Four more rabbits were afterwards inoculated subcutaneously, two with the mesenteric gland culture and two with that from the meninges, the doses being 50·0 mg. in one case, and 10·0 mg. in the case of the three other animals. All died of general tuberculosis in periods varying from 31 to 55 days.

Guinea-pigs.—Two series of four guinea-pigs each were inoculated with the same cultures as the rabbits. In each series two were inoculated intraperitoneally and two subcutaneously in doses of 1·0 and 0·1 mg. All died of tuberculosis in from 10 to 59 days.

Cats.—One cat, inoculated intraperitoneally with 1·0 mg. of the culture derived from the meninges through G.P. 1924, died after 17 days of acute tuberculosis; another, inoculated subcutaneously with an equivalent dose, was killed when ill after 36 days, and found to have acute general tuberculosis.

SUMMARY.

From a tuberculous mesenteric gland and the meninges of a child aged two years who died of tuberculous meningitis cultures have been isolated which are highly virulent for the calf, rabbit, guinea-pig, and cat.

The two strains have identical cultural characters and resemble the bovine viruses which have been included in the second of the three groups into which the various bovine strains have been divided.

VIRUS H. 70. "N.W."

PRIMARY ABDOMINAL TUBERCULOSIS.

Original material—The tissues sent were the bronchial glands, portions of the lung, spleen, liver, and the cervical and mesenteric glands.

HISTORY OF PATIENT.

The patient was a female child aged 10 months who died of tuberculous meningitis on June 17, 1906. No family history could be obtained.

The child had been vomiting since the 8th June, with constipation and pain in the head, and had attended as an out-patient from 11th to 16th June; on the latter date she was admitted to hospital as an urgent case. A convulsion occurred just before admission.

On admission the child was quite comatose, with head retracted; the breathing was stertorous, the hands clenched. The chest was normal; the pulse slow.

Lumbar puncture was performed and a small quantity of cerebro-spinal fluid drawn off.

The child died early on the day following admission, June 17, 1906.

POST-MORTEM NOTES AND DESCRIPTION OF TISSUES RECEIVED AT BLYTHWOOD.

† *Intestines.*—There was plentiful early ulceration of the lymphoid patches.

Mesenteric Glands.—The mesentery contained a number of peasized glands. On section they were all infiltrated with caseating foci and larger irregular caseating areas. These were firm, and did not break down when scraped.

† *Peritoneum.*—A few grey tubercles were seen on the peritoneum.

Liver.—Numerous miliary tubercles were seen both on surface and on section.

Spleen.—There were a few small flattened superficial tubercles on the surface, and many miliary tubercles were seen on section.

† *Kidneys.*—There were a few grey tubercles in the kidneys.

Lungs.—In a small portion of lung apparently part of an inferior lobe, a large hard nodule could be felt, filling the base of the lobe and extending some distance superiorly. On section this measured 3 by 1·2 cm., and was a mass of yellow caseating tissue, irregular in outline. It had commenced to soften at one point near the base; when the caseous débris was scraped out a small irregular cavity remained. The surface of this portion of lung was studded somewhat thickly with grey miliary tubercles with opaque centres, slightly raised above the surface. On section similar tubercles with translucent margins and yellow caseating centres were equally numerous in the depth of the lung. A single irregular yellow caseating tubercle about 0·6 cm. in diameter was also seen.

† Elsewhere in the lung there were miliary tubercles similar to those above described.

Bronchial Glands.—The bronchial glands appeared enlarged, the largest measuring 2 by 1·2 cm. On section it was very firm, yellowish white in colour, homogeneous and caseating throughout, breaking down with difficulty when scraped. The other glands were similar, but contained softer patches, which broke down easily when scraped.

Cervical Glands.—The cervical glands examined at Blythwood were four in number, the largest the size of a haricot bean. They were soft, and but little affected; in the largest a single fibrous tubercle was seen, the size of a small shot; the others appeared to be normal.

† *Meninges of Brain.*—There was early basal tuberculous meningitis.

Microscopical Examination.

Tubercle bacilli, few in number, were seen in two smears from the lung, and in one from a mesenteric gland. No tubercle bacilli were found in smears from a cervical gland, the liver, or the spleen.

One guinea-pig was intraperitoneally inoculated with an emulsion of each of the following tissues:—mesenteric gland, bronchial gland, cervical gland, spleen, liver and lung; and one rabbit intraperitoneally from each of the two former.

CULTURES.

Cultures were obtained from the lung and bronchial glands direct, and from the cervical and mesenteric glands through the guinea-pig.

All the strains have produced practically identical results on the differential media.

On glycerin-serum the growth was much better than on serum and was wrinkled or warty and in some cases pigmented.

On glycerin-agar in each case a thick creamy wrinkled layer was formed.

On potato the lung and cervical and mesenteric gland strains grew abundantly, producing very quickly raised warty and pigmented growths. The bronchial gland strain grew rather poorly on potato, on two tubes a not very thick dry greyish opaque layer, with a granular surface, was formed.

On broth and gelatine the characters of the pellicle varied a little, but in the case of each strain on one or the other medium a complete membrane was produced which was either uniform thick yellowish and wrinkled, or unequal in thickness, parts being opaque yellow wrinkled and warty, parts thinner grey and translucent.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

One guinea-pig was inoculated intraperitoneally with an emulsion of each of the following tissues: mesenteric gland (1928), bronchial gland (1929), spleen (1930), liver (1931), lung (1932), cervical gland (1933). All died of general tuberculosis in periods varying from 69 to 100 days.

One rabbit was inoculated intraperitoneally from the mesenteric gland (910), and one from the bronchial gland (911). Both were killed after 135 days and were found to have slight chronic tuberculosis.

(*b*) With culture.

Rabbits.—A series of rabbits were injected with varying doses of cultures derived from each of four sources, the mesenteric glands, the bronchial glands, the cervical gland, and the lung. In the case of the three former strains rabbits were inoculated intravenously, intraperitoneally and subcutaneously; with the strain derived from the lung no intraperitoneal inoculations were made.

In all 18 rabbits were inoculated, 6 intravenously in doses of 1·0 and 0·1 mg., 5 intraperitoneally in doses of 10·0 and 1·0 mg., and 7 subcutaneously in doses of 10·0 and 1·0 mg.

The six intravenous animals all died; two (doses 1·0 mg. each) of early general tuberculosis within five weeks, and four (doses 1·0 and 0·1 mg.) of chronic general tuberculosis after several months.

One intraperitoneal rabbit (dose 10·0 mg.) died in 14 days and showed early general tuberculosis not sufficient to account for death.

The remaining intraperitoneal and all the subcutaneous rabbits were killed at periods varying from 140 to 188 days and were found to have chronic tuberculosis of the type usually seen with viruses of Group II.

Guinea-pigs.—A series of guinea-pigs was injected with each of two strains, that derived from the mesenteric glands and that from the bronchial gland, in doses of 1·0 and 0·1 mg., intraperitoneal and subcutaneous inoculations being made in both cases. All the animals died of general tuberculosis in periods varying from 20 to 96 days.

Cats.—Three cats were inoculated with the lung culture, two intraperitoneally (doses 50·0 and 10·0 mg.), and one subcutaneously (dose 50·0 mg.). Of the two former, one died in 77 days, and showed tuberculosis of omentum and lungs, not sufficient to account for death; the other was killed after 86 days and had local tuberculosis only. The subcutaneous cat died in 29 days and showed local tuberculosis only; death was apparently due to toxaemia.

Dogs.—Two puppies were inoculated with the lung strain, one intraperitoneally and one subcutaneously (dose 10·0 mg. each), and one adult dog intraperitoneally with the same dose. The intraperitoneal puppy died in 61 days of tuberculous peritonitis and general tuberculosis. The subcutaneous puppy when killed after 143 days showed no tuberculosis; a small scar marked the site of the inoculation.

The dog inoculated intraperitoneally was killed when very ill after 413 days, and showed local tuberculosis, tuberculous pleurisy and pericarditis (severe), tuberculosis of the lungs (not very severe), and of the kidneys (slight).

Rats.—Two rats were inoculated with the bronchial gland culture, one subcutaneously, dose 10·0 mg., the other intraperitoneally and subcutaneously with the same dose. The former died in 74 days from causes other than tuberculosis, and showed local tuberculosis only; the other died in 53 days of acute tuberculosis.

Pig.—A pig was fed with 50·0 mg. of the lung culture; it was killed when well 154 days later and showed a varying number of caseo-calcareous tubercles in several glands of the neck and throat, and in several mesenteric and ileo-colic glands. There was no tuberculosis elsewhere.

SUMMARY.

From a case of general tuberculosis originating in the alimentary tract, in a child aged 10 months, cultures were isolated from a cervical, a mesenteric and a bronchial gland and the lung.

The different strains grow luxuriantly on media containing glycerin and have identical cultural characters.

They agree also in being only slightly virulent for the rabbit and virulent for the guinea-pig (two strains only tested). The lung strain was found to be slightly virulent for the pig by feeding, for the cat by subcutaneous and intraperitoneal inoculation, and for the dog by subcutaneous inoculation; it was virulent for the dog when inoculated intraperitoneally.

Virulence after Passage.

The virulence of this virus was unchanged after a residence of 484 days in the body of the rabbit (three rabbits).

VIRUS H. 72. "H.C."

TUBERCULOSIS OF A RIB.

Original material—The material sent was pus from a rib abscess.

HISTORY OF PATIENT AND DESCRIPTION OF MATERIAL RECEIVED AT BLYTHWOOD.

The patient was a man aged 49, who had had no previous illness of any importance. Of eight brothers and sisters one died of acute tuberculosis. After a slight strain an almost painless fluctuating swelling slowly formed over the anterior end of the eighth rib on the left side, and reached the size of a pigeon's egg. On being opened (on August 3rd, 1906) this proved to be a cold abscess lying over a small area of carious rib. Some of the pus obtained then was sent to Blythwood Farm (two tubercle bacilli were found in a smear made from it) and two guinea-pigs were inoculated with it. The wound did not heal, and some fever set in, followed by the appearance of a second and more acute abscess, which pointed a few inches outside and below the first. When this was opened it was found to communicate with a small cavity within the thorax.

The second wound healed satisfactorily, but the first remained a long time as a sinus, and was very slow to close. There were no symptoms or physical signs of disease of the lung, and no enlargement of the nearest glands.

CULTURES.

The strain investigated was derived from one of the guinea-pigs inoculated with the original material; the direct culture failed. Growth on glycerin-serum was more abundant than on serum and presented many raised warty scaly or wrinkled yellow patches, whereas the growth on serum was thin and almost uniform.

On glycerin-agar a thick yellowish wrinkled layer was ultimately formed.

On potato growth was luxuriant and was heaped up, warty, and pigmented.

The surface of the gelatin medium was covered in four weeks with a greyish-white layer, not quite uniform in thickness and studded with raised opaque foci; the pellicle subsequently thickened, the greater part becoming yellow and very wrinkled, the rest remaining greyish white and semi-translucent.

The broth culture failed, and at the end of several weeks only a few grey fragments were seen floating on the surface.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Two guinea-pigs, 1945–1946, were inoculated intraperitoneally with an emulsion of the pus. The former was killed after 20 days and found to be tuberculous, the latter died of chronic general tuberculosis in 108 days.

(*b*) With culture.

Calf.—One calf, No. 1165, was inoculated subcutaneously with 100·0 mg. of culture derived from guinea-pig 1945.

It was killed in good health 98 days after inoculation, and showed a collapsed and ulcerated abscess, two large fibro-calcareo-caseous nodules in the prescapular gland and no sign of tuberculosis elsewhere.

Rabbits.—A series of rabbits was inoculated with varying doses of culture derived from guinea-pig 1945, two intravenously (1·0 and 0·1 mg.), one intraperitoneally (10·0 mg.) and two subcutaneously (50·0 and 10·0 mg.). One inoculated intravenously with 1·0 milligramme died in 146 days and showed chronic tuberculosis of the lungs, kidneys and muscles. Of the others, three were killed after 183 days and two died after about the same period of causes other than tuberculosis; all showed the chronic form of disease usual with viruses of slight virulence for bovines.

Guinea-pigs.—Four guinea-pigs were inoculated, two subcutaneously and two intraperitoneally in doses of 1·0 and 0·1 mg.; all died of general tuberculosis in periods varying from 25 to 122 days.

SUMMARY.

From a case of tuberculosis of a rib in a man aged 49 a culture was obtained which grows luxuriantly on all media containing glycerin, is virulent for guinea-pigs and only slightly virulent for the calf and rabbit.

Virulence after Passage.

The virulence of this virus was unchanged after residences in the body of the calf of 327 days (three calves) and 453 days (four calves).

VIRUS H. 73. "M.E."

CASEO-CALCAREOUS MESENTERIC GLANDS.

(Death from heart disease following rheumatism.)

Original material—The specimens sent were the mesenteric glands and the bronchial glands, and portions of the lung, liver, and spleen.

HISTORY OF PATIENT.

The patient, a girl aged 10½ years, was admitted to hospital on October 15, 1906, suffering from rheumatic pericarditis, endocarditis, and pleurisy. There was no family history of tuberculosis or rheumatism, but there was a history of asthma on the maternal side. The child had been healthy up to seven years old; had had stiff neck, had rheumatic fever in 1903, and since then had had many attacks of chorea; on October 14, 1906, she became very ill, was very breathless, with great pain in the head.

On admission to hospital she was a well-nourished child with highly coloured face; there was slight cyanosis, the eyelids were puffy, there was slight dyspnoea, some painful swelling of the ankles, and the knees were painful but not swollen. The temperature was 100° F., the pulse 120, the respiration 40. There was a systolic murmur at the apex of the heart. Lungs: poor resonance and air entry at bases.

The child rapidly became worse, and died on October 27, 1906, twelve days after admission to hospital.

POST-MORTEM NOTES AND DESCRIPTION OF TISSUES RECEIVED AT BLYTHWOOD.

†*Intestine.*—No ulcers were seen in the intestine.

Mesenteric Glands.—The piece of mesentery sent contained a group of tuberculous glands, limited to one region. The glands were not fused together, and were freely movable between the layers of the mesentery. Three, close to the border, were enlarged, and ranged in size from a haricot bean to that of a broad bean. These were composed throughout of opaque creamy white friable caseous substance, gritty chiefly towards the periphery. The other affected glands contained hard nodules, which varied in size from a hemp-seed to that of a small pea. On section these were highly calcareous in the centre, and so hard that it was impossible to cut through them with a scalpel. The calcareous portion, opaque white in colour, could be shelled out *en masse*, and resembled a small irregular stone; many of the nodules were largely composed of this material, showing around the margins only a small amount of dense caseous substance. Each of the nodules was surrounded by a fibrous capsule.

An emulsion was made from one of the larger caseous glands (No. I), and one from the calcareous centre of one of the nodules (No. II).

Bronchial Glands.—The bronchial glands were congested and apparently enlarged; there was no sign of tuberculosis on section.

†*Heart and Pericardium.*—There was pericarditis and endocarditis.

Lung.—The small portion of lung sent was crepitant, and showed on the pleural surface a few small connective tissue tags. No tubercles were seen.

†There was a peculiar form of pleurisy, rheumatic?

Spleen.—No tubercles were seen in the spleen.

Liver.—The liver had a nutmeg appearance, but showed no tubercles.

†*Kidneys.*—The kidneys were congested and showed no tubercles.

†*Bones and Joints.*—Normal.

†*Peritoneum.*—The peritoneum was normal.

Microscopical Examination.

Mesenteric Gland Emulsion (I).—Tubercle bacilli numerous.

Mesenteric Gland Emulsion (II).—Tubercle bacilli fairly numerous.

Bronchial Gland.—No tubercle bacilli.

CULTURES.

Cultures were sown from two separate nodules; one of the nodules was highly calcareous, the other was dense and caseous; in both emulsions tubercle bacilli were numerous and in the latter a few organisms stained blue were seen.

All the tubes sown from the latter nodule became contaminated while all those from the former remained sterile after several months incubation.

INOCULATION EXPERIMENTS.

(*a*) With original material.

Rabbits.—Two rabbits, Nos. 965,966, were inoculated intraperitoneally, one with each of the two mesenteric gland emulsions. They were killed 34 and 65 days respectively after inoculation and were found to be perfectly healthy.

Guinea-pigs.—One guinea-pig, No. 1967, was inoculated intraperitoneally with an emulsion made from the calcareous nodule in a mesenteric gland. One (No. 1968) with an emulsion made from the spleen; and one (No. 1969) with an emulsion made from a bronchial gland. They were killed 34, 65, and 65 days respectively after inoculation, and found to be free from tuberculosis.

SUMMARY.

Mesenteric glands, containing calcareo-caseous nodules, were taken from a girl aged 10½ years, who died of heart disease following rheumatism.

Fairly numerous bacilli, morphologically indistinguishable from tubercle bacilli, were found in film preparations of the nodules, but cultures of the tubercle bacillus were not obtained, nor did any of the animals (rabbits and guinea-pigs) inoculated develop tuberculosis.

VIRUS H. 74. "D.S."

PRIMARY ABDOMINAL TUBERCULOSIS.

Original material—The specimens sent were the mesenteric glands, the bronchial glands, and small pieces of the lung, spleen, liver, kidney, and brain.

HISTORY OF PATIENT.

The patient, a seven-months old girl, was admitted to hospital in an unconscious condition on 13th November 1906

The family history showed no evidence of tuberculosis; the parents were well, the patient an only child.

The child was breast fed till she came to the hospital, and had been healthy up to the end of October 1906.

On November 1st she became fretful and had a convulsion; she was better next morning, but was never again properly conscious; there was a good deal of twitching of the limbs with vomiting and constipation; later on a squint developed.

Condition on admission.—"Very well nourished; unconscious, rigid, bulging fontanelles. Heart irregular. Lungs: respiration slow, regular, deep. Indefinite squint, paralysis of lower half of face; pupils equal, react slowly; neck muscles rigid; no retraction of head."

The child became steadily worse and died on November 17, 1906.

POST-MORTEM NOTES AND DESCRIPTION OF MATERIAL RECEIVED AT BLYTHWOOD.

† *Intestines.*—In the intestines only one doubtful ulcer was seen.

Mesenteric Glands.—In the piece of mesentery sent there were from six to eight tuberculous glands; one, the size of a pea, was caseous throughout and softened in the centre; the others contained each one caseous and softened nodule, the largest the size of a pea.

Spleen.—The portion of spleen was closely beset with grey miliary tubercles.

Liver.—The portion of liver contained numerous greyish white tubercles.

Kidney.—The portion of kidney showed two or three similar tubercles in the depth of the cortex.

† *Peritoneum.*—Normal.

Lungs.—The portion of lung sent was crepitant, and contained evenly distributed greyish white miliary tubercles, not so numerous as in the spleen.

Bronchial Glands.—Two, each about the size of peas, were composed throughout of dense opaque white caseated tissue. Another contained some small caseous foci, one softened; a larger gland was fibroid, and showed one necrotic focus.

Meninges.—There were numerous grey miliary tubercles on the surface of the piece of brain.

† *Bones and Joints.*—Normal.

Microscopical Examination.

Emulsion of Mesenteric Glands.—(1) Four tubercle bacilli seen, three long and one short. (2) No tubercle bacilli seen.

Emulsion of Bronchial Glands.—(1) One long tubercle bacillus seen. (2) No tubercle bacilli seen.

Emulsion of Spleen.—No tubercle bacilli seen.

Tubercle from Spleen (crushed).—One long tubercle bacillus seen.

Emulsion of Meninges.—Tubercle bacilli scanty.

Guinea-pigs were inoculated with emulsions of the spleen, the mesenteric glands, the meninges, the bronchial gland, and lung.

Rabbits were inoculated with emulsions of the spleen, mesenteric gland, and bronchial gland.

CULTURES.

Cultures were obtained from a mesenteric gland a bronchial gland and the spleen direct, and from the lung and a bronchial gland through the guinea-pig.

All the tubes sown with an emulsion from the meninges became contaminated.

The five strains have been tested on the differential media and have given practically identical results.

On glycerin-serum growth was luxuriant, yellow, and warty.

Some little difficulty was experienced in getting some of the strains to grow well on glycerin-agar, moist grey translucent patches only being formed, while on other media sown at the same time very good growths were obtained; after repeated attempts in some cases, all the strains at last produced characteristic creamy yellow thick wrinkled layers covering nearly the whole surface of the agar.

On potato thick raised deeply pigmented wrinkled and warty growths were produced in each case.

On broth the pellicles formed were generally greyish-white and finely wrinkled with isolated yellow warty patches; in a few cases a thicker more opaque yellow wrinkled and warty membrane was formed.

On gelatin some of the strains produced thick warty cream-coloured pellicles; the others failed to grow.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guinea-pigs.—Guinea-pigs were inoculated intraperitoneally with emulsions of the following tissues:—Spleen (1999), mesenteric glands (2000), meninges (2002–2003), bronchial gland (2001), and lung (2004).

Nos. 2001 and 2004 were killed after 30 days and found to have slight tuberculosis; the others died in a few days of acute infections.

Rabbits.—Rabbits were inoculated intraperitoneally from the spleen (1012), mesenteric gland (1013), and bronchial gland (1014).

All three were killed after 94 days; No. 1012 was found to have slight retrogressive tuberculosis of the omentum and lungs, Nos. 1013 and 1014 tuberculosis of the omentum only.

(*b*) With cultures.

Calves.—One calf, No. 1181, was inoculated subcutaneously with 50·0 mg. of culture derived from the mesenteric glands; another, No. 1183, subcutaneously with 50·0 mg. of culture from the lung. Both were killed 118 days after inoculation and were found to have tuberculosis limited to the site of inoculation and the adjacent gland.

Rabbits.—Seven rabbits were inoculated with varying doses of cultures derived from the mesenteric glands, six from the lung, six from the bronchial glands, and three from the spleen

In each series intravenous, intraperitoneal, and subcutaneous inoculations were made.

Of seven intravenous rabbits, one (dose 1·0 mg.) died in 33 days of general tuberculosis, another (dose 1·0 mg.) in 42 days, and showed tuberculosis of the lungs, bronchial glands, and kidneys, not severe; a third (dose also 1·0 mg) died in 122 days, and showed tuberculosis of the lungs and kidneys not severe and not sufficient to account for death; a fourth (dose 0·1 mg.) died in 246 days and showed slight chronic general tuberculosis, apparently insufficient to account for death; a fifth (dose 0·1 mg.) died in 123 days and showed slight tuberculosis of the lungs, kidneys, and muscles, and the cause of death was not apparent. The two remaining rabbits inoculated intravenously (doses 1·0 and 0·1 mg.) were killed after 141 and 126 days and showed slight chronic tuberculosis.

Of seven intraperitoneal rabbits three died prematurely in 35, 55 and 67 days, and showed generalised tuberculosis not severe; one (dose 10·0 mg.) died in 23 days of uncomplicated general tuberculosis; another (dose 1·0 mg.) died in 141 days of chronic general tuberculosis. The remaining two rabbits inoculated intraperitoneally (doses 10·0 and 1·0 mg.) were killed after 126 days and showed slight chronic tuberculosis.

Of eight rabbits inoculated subcutaneously two died prematurely in 31 and 50 days and showed local tuberculosis (one showed also a few tubercles in the lungs); a third (10·0 mg.) died in 109 days and showed local tuberculosis and three caseous nodules in the lungs. The remaining five rabbits (doses varying from 10·0 to 50·0 mg.) were killed after four or five months and showed chronic retrogressive tuberculosis; in two of them the disease was limited to the site of inoculation.

Monkeys.—Four rhesus monkeys (Nos. 85 to 91) were inoculated subcutaneously with varying doses (0·001 to 10·0 mg.) of culture from the lung; these died of general tuberculosis in from 30 to 54 days.

Cats.—Three kittens (Nos. 19, 21, 23) were inoculated subcutaneously with 1·0, 0·1, and 0·01 mg respectively of culture from the lung; the two former died in 7 and 2 days of causes other than tuberculosis; the latter died also in 72 days of other causes and was found to have local tuberculosis only.

Guinea-pigs.—Four guinea-pigs were inoculated with cultures derived from the mesenteric gland, two from the lung, three from the bronchial gland, and two from the spleen. In each series intraperitoneal and subcutaneous inoculations were made in doses of 1·0 or 0·1 mg. All died of general tuberculosis in periods varying from 17 to 67 days.

SUMMARY.

From a case of general tuberculosis originating in the alimentary tract, in a child aged seven months, cultures were isolated from the mesenteric gland, lung, bronchial gland, and spleen, and separately investigated as to their cultural characters and virulence.

All the strains grow luxuriantly on the differential media and have identical cultural characters.

They are all virulent for guinea-pigs and slightly virulent for rabbits, and two have been shown to possess low virulence for the calf also.

One of the strains produced subcutaneously fatal general tuberculosis in four rhesus monkeys, the doses varying from 10·0 to 0·001 mg.

VIRUS H. 75. "A.H."

PRIMARY ABDOMINAL TUBERCULOSIS.

Original material—The specimens sent were some peritoneal fluid, the mesenteric and ileo-colic glands, the bronchial glands, pieces of the lung, liver and spleen.

HISTORY OF PATIENT.

The patient, a girl aged seven years, was admitted to hospital on November 13, 1906, with signs and symptoms of tuberculous peritonitis.

The father was suffering from phthisis.

The child had complained of pain in the stomach for about one month previous to admission.

On November 22, 1906, the abdomen was opened a little to the left of the middle line and two inches below the umbilicus. The intestine was so densely and uniformly adherent to the abdominal wall that great difficulty was experienced in demonstrating the abdominal cavity at all. After carefully separating the intestine for some distance a quantity of serous fluid welled up from the right iliac fossa. The cavity was drained and the wound sutured. Some of the fluid was removed with sterile precautions and sent to Blythwood Farm.

On November 27, 1906, the patient showed signs of pneumonia in the right lung. The following day she died.

POST-MORTEM NOTES AND DESCRIPTION OF MATERIAL RECEIVED AT BLYTHWOOD.

† *Intestines.*—Two or three ulcers were seen in the jejunum.

† *Peritoneum.*—The peritoneum was thickly studded with tubercles, which were most numerous in the lower part of the peritoneal cavity, and there were adhesions everywhere; the peritoneal surface of the intestines was covered with large yellow tubercles.

Mesenteric Glands.—Some appeared slightly enlarged and congested. On section one contained a softened caseous nodule 5 mm. in diameter; another, the size of a small pea, was firm and caseous throughout; a few others contained small caseous nodules, varying in size. The rest showed no naked eye evidence of tuberculosis.

The mesentery was profusely covered with flattened yellow caseous tubercles, irregular in outline.

Ileo Colic Glands.—These glands were enlarged and congested, and showed a few caseous tubercles.

Liver.—The liver was firmly adherent all over the upper surface, and was covered with lymph. Many caseous tubercles were seen on the surface, but none in the depth; the substance of the organ was firm pale and fatty-looking.

Spleen.—The spleen also was adherent and covered with lymph. Some large caseous tubercles were seen on the surface but there was none in the depth.

† *Kidneys.*—The kidneys appeared normal.

Lung.—The piece of lung sent (apex of right), except for a small portion which was spongy and congested, was consolidated and in a state of grey hepatisation. Embedded in the solid tissue near one margin there was a caseous nodule, 1 cm. in diameter, undergoing softening.

† The rest of the lungs was deeply congested, but no tubercles were seen in it.

Bronchial Glands.—Five or six bronchial glands, the largest about half an inch in diameter, were fused together to form a mass measuring 3·2 by 2 cm. On section two of these were composed practically throughout of firm yellowish white caseous substance; another was caseous chiefly around the cortex, whilst the rest were less affected. The caseous substance did not readily break down on scraping, and was slightly gritty from calcification. Two other separate bronchial glands contained each a hemp seed sized firm yellow caseous nodule.

† *Heart and Pericardium.*—The pericardium was full of fluid and the heart was covered with thick lymph.

† *Meninges of Brain.*—Normal.

† *Bones and Joints.*—Normal.

Microscopical Examination.

Three tubercle bacilli were seen in an emulsion made from the lung nodule, and a few were seen in a smear from one of the bronchial glands. None were seen in smears from the spleen or the liver.

Guinea pigs were inoculated with emulsions made from the lung nodule, the bronchial glands, the spleen, and the mesenteric glands.

Rabbits were inoculated with emulsions of the lung and bronchial gland.

CULTURES.

Four tubes of the egg medium were sown on November 22, 1906, with some of the peritoneal fluid of the patient withdrawn during life.

The tubes were incubated for two months and remained sterile.

On November 30, 1906, about 48 hours after the death of the patient cultures were sown from the lung, a bronchial gland and a mesenteric gland.

All the tubes sown from the mesenteric gland became hopelessly contaminated with colon bacilli and other organisms.

The tubes sown from the lung and the bronchial gland developed numerous streptococcus colonies; on further incubation a few colonies of the tubercle bacillus appeared amongst the streptococcus colonies on nearly all the tubes; subcultures were made from several of the tubes; those from the bronchial gland failed; the subculture from the lung was mixed with streptococci which persisted for several generations. In order to separate the two a guinea-pig was inoculated; this became tuberculous, and a pure culture of the tubercle bacillus was isolated from the omentum.

A culture was also obtained from Guinea-pig 2018 which had been inoculated with peritoneal fluid.

Both strains, the one isolated from the lung, the other from the peritoneal fluid, grow well on all media containing glycerin.

On glycerin-serum growth was very abundant and much thicker than on serum alone.

On glycerin-agar and glycerin-potato good growths were not obtained with the peritoneal fluid strain until the organism had been subcultivated for several generations; the thirteenth generation produced on these media moderately thick creamy yellow highly wrinkled growths.

The lung strain on the other hand produced on these media thick wrinkled yellow growths in a much earlier generation.

In the case of both strains the surface of broth quickly became covered with growth which was for the most part thick opaque creamy and warty, the rest being thinner and greyer; a later generation of the peritoneal fluid strain produced on broth a pellicle which was uniformly thick opaque white and wrinkled with a few yellow warty patches.

The growths on gelatine broth were similar in character, but on the whole not so abundant.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guinea-pigs were inoculated intraperitoneally with emulsions of the following tissues: bronchial gland (2039–2040), lung (2042), spleen (2043), mesenteric gland (2044). Of these No. 2044 was killed after 21 days and found to have tuberculosis of omentum only; No. 2040 was also killed after 21 days and showed no sign of tuberculosis; the others died of acute infections in from 1 to 15 days.

Three guinea-pigs were also inoculated with peritoneal fluid. No. 2018 (intraperitoneal) killed after 29 days, was found to have very slight tuberculosis; Nos. 2019 (subcutaneous) and 2020 (intraperitoneal) died after 95 and 55 days respectively, and were found to have general tuberculosis.

Rabbits.—Three rabbits were inoculated with emulsions of bronchial gland and lung; these died of acute infections in from one to four days.

Two rabbits, Nos. 1015 and 1016, were inoculated intraperitoneally with the peritoneal fluid. Both were killed after 78 days; the former showed a few tubercles in the omentum only, the latter was healthy throughout.

(*b*) With culture.

Calf.—One calf, No. 1195, was inoculated subcutaneously with 50·0 mg. of culture derived from the peritoneal fluid through Guinea-pig 2018. It was killed when well on the 97th day and was found to have a cystic tumour at the seat of inoculation, fibro-calcareo-caseous nodules in the adjacent prescapular gland, and no tuberculosis elsewhere.

Rabbits.—Four rabbits were inoculated with culture derived from the peritoneal fluid, and four with culture derived from the lung through Guinea-pig 2459.

In the first series intravenous, intraperitoneal, and subcutaneous inoculations were made; in the second intravenous and subcutaneous only.

The two intravenous rabbits of the first series (doses 1·0 and 0·1 mg.) were killed after 101 days; one showed moderately severe general tuberculosis, the other slight tuberculosis of the lungs and kidneys. The intraperitoneal rabbit (dose 10·0 mg.) died in 92 days of tuberculous peritonitis, tuberculosis of the lungs (severe) and kidneys. The subcutaneous rabbit (dose 10 0 mg.) was killed after 101 days and showed local tuberculosis and a few tubercles in the lungs.

One intravenous rabbit of the second series (dose 1 0 mg.) died prematurely in 13 days and showed early general tuberculosis; the other (dose 0·1 mg.) died in 66 days of tuberculosis of the lungs (moderately severe), kidneys, and one sternal gland. The two subcutaneous rabbits (dose 10·0 mg. each) were killed after 192 days and showed slight chronic tuberculosis of the type usual with viruses of Group II.

Guinea-pigs.—Four guinea-pigs were inoculated, two intraperitoneally and two subcutaneously, with the culture derived from the peritoneal fluid, in doses of 1·0 and 0·1 mg. All died of general tuberculosis in periods varying from 14 to 49 days.

Cats.—One cat, No. 31, was inoculated intraperitoneally with culture derived from the peritoneal fluid; a second, No. 33, subcutaneously; a third, No. 35, was fed. The dose in each case was 10·0 mg.

No. 31 died in 94 days and showed tuberculosis limited to the lungs and insufficient to account for death, the cause of which was not apparent. Nos. 33 and 35 were killed after 98 days; the former showed a small caseo-fibrous lesion at the seat of inoculation, and an adjacent inguinal gland partly caseous; the latter was healthy throughout.

SUMMARY.

The original material in this case was peritoneal fluid, withdrawn during life, and the lung of a girl aged seven years, who died of pneumonia following laparotomy, and showed on post-mortem examination extensive tuberculous peritonitis a caseous nodule in the lung and tuberculosis of the mesenteric and bronchial glands.

A culture isolated from the peritoneal fluid grows luxuriantly on media containing glycerin, is virulent for the guinea-pig and slightly virulent for the calf, rabbit, and cat; a culture isolated from the lung is identical in cultural characters and in virulence for the rabbit.

VIRUS H. 76. "G.M."

TUBERCULOSIS OF A KNEEJOINT.

Original material—The heads of the femur and tibia, with attached membranes.

HISTORY OF PATIENT.

The patient, a man aged 30 years, was admitted to hospital on January 8, 1908, for tuberculosis of the kneejoint. The illness began eleven months before admission with pain in the left kneejoint; the joint began to swell six months before admission; there was no history of injury. The patient had always been healthy: there was no history of any illness.

There was no family history of tuberculosis. The father died of pneumonia or some other chest complaint, the mother was alive and well, and there were three sisters and one brother alive.

On admission to hospital the left kneejoint was enlarged and contained fluid; the synovial membrane appeared to be thickened; there was limitation of flexion which caused pain, and of extension; there was a swelling in the substance of the inner head of the gastrocnemius not accompanied by pain or tenderness. There were no physical signs in the chest.

On January 14, 1908, an operation was performed. The kneejoint was excised and adjacent cavities in the leg and thigh scraped and flushed out. The pulpy synovial membrane, together with the heads of the femur and tibia, was sent to Blythwood.

Subsequent history of patient.—During February the partially healed wound was breaking down, showing tuberculous gelatinous tissue; on the 21st the wound was thoroughly scraped and flushed out. In April, 1908, there were several tuberculous septic sinuses.

DESCRIPTION OF MATERIAL RECEIVED AT BLYTHWOOD.

The heads of the femur and tibia, with attached membranes. An emulsion was made of some of the pulpy synovial membrane; a smear from the emulsion showed tubercle bacilli in moderate numbers. Two guinea-pigs were inoculated with it.

CULTURES.

Cultures were obtained from the two guinea-pigs inoculated with the original material.

Both cultures have been tested on the differential media and have shown identical cultural characters.

The growths on serum were good and pigmented; they were even better on glycerin-serum and more pigmented.

On glycerin-agar thick continuous creamy wrinkled layers were formed.

On potato the growths were abundant raised and wrinkled or warty and of a yellowish colour.

Growth on broth was not very abundant; in one case the whole surface of a bottle of broth became covered with a pellicle composed of not very thick whitish patches and thin grey growth.

The surface of a bottle of gelatine became covered with a thin grey membrane containing opaque moist whitish patches.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guinea-pigs.—Two guinea-pigs, 2887 and 2888, were inoculated intraperitoneally with an emulsion made from the synovial membrane. The former died in 27 days, the latter was killed when dying on the same day; both showed early general tuberculosis.

(*b*) With culture.

Rabbits.—Four rabbits were inoculated, two intravenously and two subcutaneously, with various doses of culture derived from the original material through Guinea-pig 2887.

One intravenous rabbit (dose 0·01 mg.) died in seven days as the result of injuries; the other (dose 1·0 mg.) died in 44 days and showed a moderate number of minute glassy tubercles in the lungs which were crepitant, a few minute yellow tubercles in spleen and liver, numerous caseous tubercles in the kidneys, caseous patches or tubercles in most of the lymphatic glands, and fairly numerous caseous tubercles on the peritoneum.

One subcutaneous rabbit (dose 50·0 mg.) was killed after 175 days. There was a thin-walled cyst at the seat of inoculation, sparsely scattered grey tubercles with caseous centres and one caseous nodule in the lungs, and two or three grey tubercles with caseous centres in each kidney.

The other (dose 10·0 mg.) was killed on the same day. There was a large thin-walled cyst at the seat of inoculation, and a few calcareous grains in the adjacent scapular gland. The lungs contained small scattered nodules; the majority had caseous centres and fibrous margins.

Guinea-pigs.—Two guinea-pigs were inoculated each with 1·0 mg. of culture derived from the original material through Guinea-pig 2887, one intraperitoneally, the other subcutaneously. The former died of general tuberculosis in 13 days; the latter died in 3 days, the cause of death was not apparent.

Rhesus Monkeys.—Two monkeys Nos. 227 and 229 were inoculated subcutaneously each with 1·0 mg. of culture derived from the original material through G.P. 2387; they both died in 30 days of general tuberculosis.

Goat.—Goat 75 was fed with 74·0 mg. of the same culture; she was killed after 328 days and showed tuberculosis limited to the glands of the alimentary tract.

SUMMARY.

From the tuberculous synovial membrane of the kneejoint of a man aged 30 years a culture was obtained which grows luxuriantly on glycerin media, is slightly virulent for rabbits and virulent for the guinea-pig and rhesus monkey.

VIRUS H. 77. "R.L."

PRIMARY ABDOMINAL TUBERCULOSIS.

Original material—The specimens sent were portions of the small and large intestines, the mesenteric glands, the suprarenal bodies, portions of the lung, liver, spleen and kidney.

HISTORY OF PATIENT.

The patient, a boy aged 13 months, was admitted to hospital on 8th December 1906.

The family history showed no evidence of tuberculosis. There were two other children, one had had rheumatism and chorea, the other appendicitis.

The child was small at birth. He was fed on cow's milk and barley water for the first eight months; he then got whooping cough and diarrhœa and was put on Milo's food for three months, then on Benger's. Three months before admission the child had diarrhœa with vomiting and wasting, and swelling of the stomach for two months.

On admission he was pale and fretful; the fontanelles were widely open. The temperature was 101·4, the pulse 120, the respirations 36. The abdomen was distended, tense, and resonant, the liver and spleen were large. Glands were felt in the inguinal region. The heart was normal. Lungs—abundant râles were heard at base.

The child died on December 9th, 1906, the day following admission.

POST-MORTEM NOTES AND DESCRIPTION OF MATERIAL RECEIVED AT BLYTHWOOD.

Small Intestine.—The mucous surface of the piece of small intestine sent to Blythwood showed a transverse ulcer 7 mm. in long diameter, with raised undermined margins and slightly thickened base, containing a millet-seed sized caseous tubercle. The floor of the ulcer was clean, and showed no sign of caseation. The whole of the serous surface of the small piece of intestine was studded with grey tubercles, slightly opaque in the centre, the largest the size of a millet seed.

Large Intestine.—The piece of large intestine sent was about four inches in length. The mucous membrane showed five ulcers, with congested margins, the largest 8 mm. in diameter; the bases were not thickened or caseous. A scraping from the floor of one revealed fairly numerous tubercle bacilli.

Along the attachment of the meso-colon there were a portion of an enlarged caseous gland and a number of caseating nodules, the largest the size of a split pea. Some of these were possibly small caseous glands.

Mesenteric Glands.—A piece of the mesentery containing a number of enlarged glands was sent. The glands were not adherent to each other, and varied a little in size, the largest being about half an inch in greatest diameter. On section they were composed throughout of firm opaque whitish homogeneous caseous substance, which did not break down on scraping with a scalpel.

Mesentery.—The mesentery was closely studded with firm caseous nodules (resembling on section the mesenteric glands), ranging in size up to that of a hemp seed.

†*Peritoneum.*—The peritoneal tissues, other than those described above, were profusely covered with small tubercles and there were some adhesions.

The Lungs and †Bronchial Glands, the Spleen, Liver and Kidneys, and the †Meninges of the Brain, were examined and showed no naked-eye evidence of tuberculosis.

Suprarenal Capsules.—These were also free from macroscopic evidence of tuberculosis. (No tubercle bacilli were found in a scraping from the medulla.)

†*Bones and Joints.*—Normal.

Microscopical Examination.—Tubercle bacilli were fairly numerous in emulsions of the mesenteric glands and of the nodules in the mesentery, and in a scraping from an ulcer in the large intestine. No tubercle bacilli were found in emulsions of the spleen, liver, and suprarenal.

Guinea-pigs were inoculated with emulsions of the mesenteric glands and nodules, the spleen, and the liver.

Rabbits were inoculated with an emulsion of the mesenteric glands and nodules.

CULTURES.

Cultures were obtained from the mesenteric glands, direct from the original material and through the rabbit; a culture was also obtained from the liver through the guinea-pig. All the strains agree in their cultural characters, and are identical with bovine viruses which grow with most difficulty on media containing glycerin.

On glycerin serum there was no growth at the end of the first week; towards the end of the second week discrete colonies became visible over the surface; these increased slightly in size and showed little tendency to coalesce. On the same serum without glycerin a very thin uniform grey layer was seen at the end of the first week, which did not increase in thickness subsequently.

On all kinds of serum, even after several subcultures, the various strains of this virus have yielded very poor growths, quite obviously thinner than those produced after less prolonged subcultivation by viruses which grow well on media containing glycerin.

No growth has as yet been obtained on glycerin-agar. On potato thin dry grey layers, in one case with a finely granular surface, have been produced.

The whole surface of a bottle of glycerin-broth was covered in less than a month with a thin grey transparent membrane, which subsequently showed no tendency to thicken or to become moist and sink.

No growth has been obtained on gelatin.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guinea-pigs were inoculated intraperitoneally with emulsions of the following tissues:—Mesenteric glands and nodules (2103, 2104, 2105, 2106), spleen (2101), liver (2102). Of these, No. 2103 died after 4 days, no cause of death being apparent, No. 2104 was killed after 30 days and showed general tuberculosis, Nos. 2105 and 2106 died of general tuberculosis in 55 and 96 days respectively, 2101 died of an acute infection in two days, and 2102 was found to have slight general tuberculosis when killed after 31 days.

Rabbits.—Three rabbits (1041 and 1043, intraperitoneal, and 1042 subcutaneous) were inoculated with an emulsion made from the mesenteric glands. They all died of general tuberculosis in 51, 32, and 59 days respectively.

(*b*) With culture.

Calf.—One calf, No. 1349, was inoculated subcutaneously with 50·0 mg. of culture derived from the mesenteric glands direct; it died in 19 days of acute general tuberculosis.

Rabbits.—Eight rabbits were inoculated with varying doses of culture derived from the mesenteric glands direct, and four with varying doses of culture derived from the liver through G.P. 2102. In each series intravenous intraperitoneal and subcutaneous inoculations were made. One rabbit (intraperitoneal, dose 1·0 mg.) died in seven days of early tuberculous peritonitis complicated by pseudo-tuberculosis. Six others inoculated intravenously and intraperitoneally died of general tuberculosis in from 14 to 23 days. Five, inoculated subcutaneously, died in periods varying from 56 to 84 days.

Guinea-pigs.—Guinea-pigs were inoculated with the same strains of culture as the rabbits. Three inoculated intraperitoneally each with 0·1 mg. died in from 12 to 20 days of general tuberculosis; a fourth inoculated subcutaneously with an equivalent dose died in 55 days.

SUMMARY.

A case of primary abdominal tuberculosis in a child aged 13 months.

Emulsions of the tuberculous mesenteric glands produced fatal tuberculosis in rabbits.

A culture derived from the tuberculous mesenteric glands produced acute general tuberculosis in a calf, and this strain of culture and also a strain obtained from the liver produced fatal tuberculosis in rabbits and guinea-pigs. The strains are identical in cultural characters with cultures isolated direct from tuberculous lesions in the bovine.

VIRUS H. 78. "O.D."

GENERAL TUBERCULOSIS, PROBABLY PRIMARY IN THE CERVICAL GLANDS.

Original material—The specimens sent were the bronchial and the mesenteric glands, the spleen, portions of the lung, liver, kidney, and brain.

HISTORY OF PATIENT.

The patient was a boy aged nine months, admitted to hospital for cough on December 5, 1906.

There was a history of tuberculosis in the family, the father having died of "consumption of the throat." The child was breast-fed.

He was taken suddenly ill three weeks before admission; previously he had always been a strong baby. The illness came on with crying and sickness and loss of appetite; there was no diarrhœa. The child became gradually worse.

On admission to hospital he was pale and looked very ill; there was severe dyspnoea. The temperature was 101·2, the pulse 168, the respiration 60. Lungs: tubular breathing and rhonchi were heard at left root, dulness and bronchial breathing over the right scapula. The abdomen, liver, and spleen were enlarged.

The child became rapidly worse, got convulsions, and died on December 12, 1906, seven days after admission.

POST-MORTEM NOTES AND DESCRIPTION OF SPECIMENS RECEIVED AT BLYTHWOOD.

Lungs.—The piece of lung sent was firm, dark red, and airless. It contained numerous discrete caseous tubercles with grey margins, ranging in size from 0·5 to 2 mm. in diameter. †Similar tubercles were scattered throughout both lungs, and there was a large patch of pneumonic consolidation at the apex of the left lower lobe.

Bronchial Glands.—The bronchial glands were enlarged, the largest measuring about 1 cm. in diameter, and extensively caseous. Two or three were closely beset with more or less discrete opaque white caseous tubercles, but the majority were caseous throughout, the caseous substance being wholly or partially converted into greenish pus.

†*Peritoneum.*—The somatic peritoneum was normal.

Liver.—The piece of liver showed one pinhead-sized greyish-white tubercle on the surface, and one in the depth.

Spleen.—The spleen was very closely beset with soft yellow caseous tubercles, somewhat irregular in outline, the largest 2 mm. in diameter.

Kidneys.—The piece of kidney showed in the depth of the cortex a miliary caseous tubercle. †There was one tubercle only on the surface of one of the kidneys.

†*Intestines.*—There was no ulceration of the intestine.

Mesenteric Glands.—The mesenteric glands were normal in size and general appearance.

Brain.—The piece of brain showed on the surface numerous opaque whitish tubercles aggregated together around a vessel.

†*Cervical Glands.*—The cervical glands were caseous; there were no scars in the neck.

†*Bones and Joints.*—Normal.

Microscopical Examination.

Emulsion of Brain (meninges).—Tubercle bacilli scanty. Cocci in pairs.

Emulsion of Spleen.—No tubercle bacilli. Numerous cocci in pairs.

Emulsion of Lung.—Tubercle bacilli scanty. A few cocci.

Emulsion of Bronchial Gland.—(1) Tubercle bacilli scanty. A few cocci (?). (2) Tubercle bacilli fairly numerous.

Tubercle from Spleen.—Tubercle bacilli scanty.

Tubercle from Kidney.—Tubercle bacilli scanty.

Guinea-pigs were inoculated with emulsions of the bronchial gland, the spleen, the meninges, and the lung.

Rabbits were inoculated with emulsions of the bronchial gland and the spleen.

CULTURES.

Cultures were sown directly from the lung, bronchial gland, spleen and meninges.

All the tubes sown from the meninges became overrun with colon-like organisms.

On the tubes sown from the lung and bronchial gland in a few days numerous transparent colonies developed which were shown by animal experiment to be formed by the diplococcus pneumoniae. On further incubation three of the tubes sown from the bronchial gland showed a few scattered colonies of the tubercle bacillus and a pure culture was obtained by carefully picking out a single colony from the surrounding pneumococcus colonies.

No colonies of the tubercle bacillus developed on tubes sown from the spleen and lung.

Cultures were however obtained through the guinea-pig from the lung and also from a bronchial gland and the meninges (two strains).

All the strains, two from the bronchial gland, one from the lung and two from the meninges, have been tested on the differential media and have given thereon practically identical results.

On glycerin-serum growth was much more abundant than on serum alone, and was raised wrinkled and warty and cream coloured. The growth on glycerin-agar was thick uniform creamy-yellow and wrinkled, spreading in some cases up the sides of the tubes.

On potato the growths varied a little in thickness, but were all continuous raised wrinkled or warty and pigmented.

On glycerin broth and gelatine good growths were obtained, the pellicles in most cases being thick opaque wrinkled and whitish, the summits of the wrinkles having a creamy tinge.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guinea-pigs.—Guinea-pigs were inoculated with emulsions of various tissues, bronchial gland (2117 intraperitoneal, 2118 subcutaneous), spleen (2119 intraperitoneal, 2120 subcutaneous), meninges (2121, 2122 intraperitoneal), lung (2123, intraperitoneal).

No. 2117, killed after 28 days, showed slight general tuberculosis; No. 2118 died of general tuberculosis in 69 days, No. 2119 in 98 days. No. 2120 died from causes other than tuberculosis in 9 days, Nos. 2121 and 2122 died of general tuberculosis in 22 and 21 days respectively, and No. 2123 was found to have general tuberculosis when killed after 28 days.

Rabbits.—Two rabbits, Nos. 1046 and 1047, were inoculated intraperitoneally with emulsions of bronchial gland and spleen respectively. The former when killed after 92 days showed slight tuberculosis of peritoneum and lungs; the latter died in one day of an acute infection.

(*b*) With culture.

Calves.—Two calves were inoculated subcutaneously, Nos. 1185 and 1179, each with 50·0 mgs. of culture derived respectively from the bronchial gland (direct), and the meninges (through guinea-pig 2122).

Both were killed 127 days after inoculation.

No. 1185 showed a fibro-caseous local tumour; caseous and calcareous lesions in the left prescapular and two left cervical glands; and one doubtful tubercle in the lung.

No. 1179 showed a local lesion similar in character to that in Calf 1185; three small fibro-calcareous patches in the left prescapular gland; a few minute calcareous foci in the thoracic glands, and one in a mesenteric gland.

Rabbits.—Five rabbits were inoculated with varying doses of culture derived from the lung, four from the bronchial gland and four from the meninges. Intravenous, intraperitoneal, and subcutaneous inoculations were made in each case.

Of six rabbits intravenously inoculated one (1·0 mg.) died of acute general miliary tuberculosis in 18 days, another (1·0 mg.) died of general miliary tuberculosis in 28 days; a third (0·1 mg.) died in 171 days of general tuberculosis, and showed the lungs almost entirely composed of confluent caseating nodules and tubercles, several fibro-caseous nodules in the kidneys, and one testicle greatly enlarged and caseous throughout, the disease in this rabbit being undistinguishable from that produced by virulent viruses.

The three remaining rabbits inoculated intravenously (doses 1·0 and 0·1 mg.) were killed after 140 and 141 days and showed chronic retrogressive tuberculosis.

Of four rabbits inoculated intraperitoneally, two (dose 10·0 mg. each) died of general tuberculosis in 20 and 28 days, the others (doses 10·0 and 1·0 mg.) were killed after 141 days and showed chronic retrogressive tuberculosis.

The three rabbits inoculated subcutaneously (dose 10·0 mg.) were killed after 140, 141, and 188 days; and two showed local tuberculosis and slight tuberculosis of the lungs. In the third there was a group of large caseo-purulent cysts at the seat of inoculation, and two small caseous nodules in the adjacent axillary gland; more than half of the left caudal lobe of the lungs was composed of caseating masses, that of the right was similarly but less severely affected; the ventral margins of the cephalic lobes were tuberculous, and elsewhere in the lungs scattered caseous tubercles were seen. There was no tuberculosis in the other organs and glands.

Guinea-pigs.—Four guinea-pigs were inoculated with culture derived from the lung, four from the bronchial gland and two from the meninges, in doses of 1·0 and 0·1 mg. In each case intraperitoneal and subcutaneous inoculations were made. All the animals died of general tuberculosis in periods varying from 16 to 80 days.

SUMMARY.

From a case of general tuberculosis (probably primary in the cervical glands) in a boy aged nine months, cultures were obtained from different organs, *i.e.* the lung bronchial gland and meninges.

All the strains grow luxuriantly on the differential media, their cultural characters being practically identical.

They are virulent for the guinea-pig and only slightly virulent for the rabbit, and two of the strains (bronchial gland and meninges) have been shown to possess low virulence for the calf.

VIRUS H. 79. "J.N."

TUBERCULOSIS OF THE LUNG.

Original material—The specimens sent were the mesenteric glands, the right suprarenal body, portions of the lungs, and of the spleen.

HISTORY OF PATIENT.

The patient was a young man aged 24 years, admitted to hospital on September 21, 1906.

There was no history of tuberculosis in the family; the father and mother and five sisters were alive and well; two sisters died in infancy.

The patient was always well up to five and a half years ago when he had an attack of mercurial poisoning; about three years ago he suffered from diarrhœa, which continued more or less up to the time of admission, and he had become very thin; for the last three weeks he had had oedema of the legs.

On admission, the tongue was glazed, the abdomen was not distended; there was tenderness in the right hypochondrium. The liver and spleen appeared normal in size. A soft systolic bruit was heard at the base of the heart. Both femoral veins were thrombosed.

During the last four months a bronze splash of colour had appeared across his forehead; there was no pigmentation elsewhere. It was thought by his medical attendant that he was suffering from Addison's disease.

During his stay in hospital the patient suffered much from abdominal pains and occasional distention. He continued to lose weight, and died on December 26, 1906, with symptoms of general peritonitis.

POST-MORTEM NOTES AND DESCRIPTION OF MATERIAL RECEIVED AT BLYTHWOOD.

Lung.—The portion of the base of the left lung was dark red, firm, and almost completely airless. On section it showed a tough yellowish white caseous patch, irregular in outline and about 2 cm. in greatest diameter, and a few smaller irregular or greyish yellow firm patches, the latter apparently originating in the smaller bronchi. There was besides a number of small greyish tubercles.

The portion of the apex of the right lung was crepitant, but abnormally tough and slightly congested. On squeezing it between the fingers and thumb several hard tubercles, 1 to 2 mm. in diameter, were felt; these on section were fibrous and pigmented, and one had a yellow caseous centre, which shelled out. Besides the smaller tubercles there was one pea-sized caseous nodule, on section tough opaque and yellowish white. In the centre of this portion of lung there was a thickened bronchus (crow-quill) plugged with yellow breaking down caseous material (tubercle bacilli in clumps). Another thickened bronchus contained clear mucus.

†No tubercles were seen elsewhere in the lungs at the post-mortem examination.

†*Bronchial Glands.*—The bronchial glands were not examined.

Spleen.—Normal.

†*Kidneys.*—Normal.

†*Liver.*—The liver was pale and fatty.

Right Suprarenal body.—The suprarenal was pale and soft, and enlarged (?). On section there was no macroscopic evidence of tuberculosis, or indeed of any other morbid condition.

†*Peritoneum.*—The peritoneum was inflamed and thickened.

†*Intestines.*—The small intestines were enormously dilated in places, with many strictures, one very tight one; the walls were much thickened, the peritoneal surfaces showing signs of old peritonitis probably tuberculous; there were a few adhesions.

Mesenteric Glands.—Normal.

†*Bones and Joints.*—Normal.

Microscopical Examination.

Emulsions were made from the following lesions of the Lung:—

(*a*) *Pea-sized caseous nodule.*—Tubercle bacilli numerous.

(*b*) *Small fibrous tubercle.*—Tubercle bacilli.

(*c*) *Small caseous patch in the consolidated piece of lung.*—Tubercle bacilli.

(*d*) *Large caseous patch.*—Tubercle bacilli.

Emulsion of the Suprarenal.—No tubercle bacilli.

Scraping from the Suprarenal.—No tubercle bacilli.

Four rabbits were inoculated, one each with emulsions (*a*), (*c*), and (*d*), made from the lung, and one with an emulsion made from a suprarenal body. Six guinea-pigs were inoculated, two from the suprarenal, four from the lung.

CULTURES.

Cultures were isolated from the lung direct and through Guinea-pigs 2152 and 2154.

The three strains grow with equal luxuriance on the differential media.

On glycerin serum growth was very abundant warty and pigmented.

On glycerin agar thick creamy wrinkled membranes were formed.

On potato growth was very thick raised wrinkled and pigmented.

The surface of glycerin broth was quickly covered with a thick opaque creamy white pellicle, warty in places, wrinkled in others.

The surface of a bottle of glycerin gelatine broth was in one case covered in about five weeks with a moderately thick greyish-white highly wrinkled pellicle, the summits of the wrinkles having a cream-yellow colour.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guinea-pigs.—Guinea-pigs were inoculated intraperitoneally with emulsions of the suprarenal body (2149 and 2150) and of the lung (2151, 2152, 2154, and 2153 [intramuscular]).

The two former were killed after 52 days and found to be perfectly healthy; of those inoculated with lung emulsions, No. 2151 was killed after 52 days and found to be perfectly healthy; Nos. 2152, 2153, also killed after 52 days, showed general tuberculosis; and No. 2154 died of general tuberculosis after 49 days.

Rabbits.—Four rabbits were inoculated intraperitoneally, one (No. 1068) from the suprarenal body, three (Nos. 1069, 1070, 1085) from the lung. No. 1068 was killed after 108 days and found to be perfectly healthy; Nos. 1069 and 1085 killed after 108 and 103 days respectively were found to have slight retrogressive tuberculosis; No. 1070 died in three days of an acute infection.

(*b*) With cultures.

Calf.—One calf, No. 1205, was subcutaneously inoculated with 50·0 mg. of culture derived from the lung. It was killed when in good health after 138 days and was found to have a small fibroid lesion at the seat of inoculation; fibro-calcareous and caseous lesions occupying nearly the whole of the left prescapular gland; and three or four grey translucent foci in the lung.

Rabbits.—Four rabbits were inoculated with various doses of culture derived from the lung. One, inoculated intravenously with 1·0 mg., died in 33 days of general tuberculosis; another, inoculated intraperitoneally with 10·0 mg. died in 12 days and showed early general tuberculosis.

The two remaining animals [one intravenously (0·1 mg.) and one subcutaneously (10·0 mg.) inoculated] were killed after 185 days and showed chronic retrogressive tuberculosis of the usual type.

Guinea-pigs. — Two guinea-pigs were inoculated intraperitoneally and two subcutaneously with culture derived from the lung, in doses of 1 0 and 0·1 mg.

One of the latter died in 18 days and showed very slight tuberculosis; the others died of general tuberculosis in 17, 18, and 46 days respectively.

Goat.—Goat 59 was inoculated subcutaneously with 100·0 mg. of culture derived from the lung. It was killed after 106 days and showed local tuberculosis, one tubercle in the liver and a few small tubercles in the kidneys, and caseous gritty patches or tubercles in the mesenteric ileo colic one iliac and one submaxillary glands.

Dogs.—Dogs 31 (young adult) and 33 (puppy) were inoculated intraperitoneally with culture derived from the lung, the doses being 50·0 and 10·0 mg. respectively. They died in 31 and 32 days and each showed acute tuberculous peritonitis and general tuberculosis.

Cat.—One cat, No. 37, was inoculated intraperitoneally with 50·0 mg. of culture derived from the lung. It died 56 days later and showed a caseating patch in the subperitoneal tissues at the seat of inoculation, a large caseous softened mass and a few grey points of a doubtful nature in the liver; two or three caseating nodules and several miliary tubercles in each kidney; and seven caseous nodules up to a pea in size and scattered grey tubercles on the surface of the lungs. Tubercle bacilli were found in the spleen. The cause of the death of the animal was not determined.

SUMMARY.

From the lung of a man aged 24, who died from multiple strictures of the small intestine and showed at the post-mortem examination chronic tuberculosis of the lungs, cultures were isolated which grow luxuriantly on all media containing glycerin.

One of these strains proved to be slightly virulent for the calf, rabbit, goat and cat, virulent for the guinea-pig, and virulent for the dog by intraperitoneal inoculation.

Virulence after Passage.

The virulence of this virus was unchanged after residences in the body of the calf of 485 days and 418 days (four calves each) and 316 days (three calves).

VIRUS H. 80. "D.M."

TUBERCULOSIS OF THE LUNG.

Original material—The specimens sent to Blythwood were the right lung, a portion of the left lung, the bronchial glands, and the spleen.

HISTORY OF PATIENT.

The patient was a man aged 33, admitted to hospital on January 19, 1907. He had one attack of haemoptysis six months previously. No family history could be obtained.

On admission the patient was very weak, cyanosed, and dyspnoeic. There was impaired movement down the whole of the left side, with dulness cavernous breathing and crepitations at the apex, and dulness bronchial breathing and crepitations at the base. The right base was dull and there were no breath sounds vocal resonance or fremitus.

On January 20, 1907, the day following admission, the patient died.

POST-MORTEM NOTES AND DESCRIPTION OF MATERIAL RECEIVED AT BLYTHWOOD.

Lungs.—The apex of the left lung contained two cavities, one 2 cm., the other 1 cm. in diameter, surrounded by dense fibroid lung tissue containing discrete caseous nodules. The larger cavity had a fibrous capsule, the internal surface of which was covered with a thin layer of yellow pus. The rest of the lung was crepitant, and contained scattered discrete caseous nodules up to 1 cm. in diameter; these nodules were firm yellowish-white dry and fairly friable, and had thin fibrous capsules. About the middle of the dorsal border there was a slightly raised firm patch, measuring 5·5 by 2 cm. in area; on section it had a wedge shape, penetrating 2 cm. into the lung substance, and was dense fibroid and caseating.

The right lung was collapsed. The diaphragmatic pleura was covered with an opaque yellow fibrinopurulent adherent layer; the rest of the pleura was toughened and thickened, and had in places a honeycombed and finely villous appearance. Attached to the pleura at the apex there was a tough fibrous band (adhesion).

The apical part of the upper lobe and that of the lower lobe was collapsed, fibroid, and studded with caseous nodules of various sizes, the largest 1·5 cm. in diameter (pieces from these parts of the lung sank in water); the larger ones were distinctly softened, and one showed commencing cavity formation; the smaller ones were firmer, resembling those in the left lung. In the rest of the right lung there were fairly numerous small grey fibrous tubercles and here and there a caseous nodule.

Bronchial Glands.—Deeply pigmented; otherwise normal.

†*Pleura.*—There was tuberculous pleurisy with great effusion on the right side.

†*Peritoneum, Liver, Intestines, and Mesenteric Glands.*—Normal.

Spleen.—The spleen was very large and dark red. It showed no macroscopical evidence of tuberculosis (a guinea-pig inoculated with an emulsion made from it however became tuberculous).

†*Kidneys.*—Congested.

†There were no scars in the neck.

Microscopical Examination.

Emulsion of nodules from Lung (1).—Numerous tubercle bacilli in clumps.

Emulsion of nodules from Lung (2).—Numerous tubercle bacilli in clumps.

Scraping from Spleen.—No tubercle bacilli seen.

Calves, dogs, rabbits, and guinea-pigs were inoculated with emulsions made from the lung. A guinea-pig was inoculated with an emulsion made from the spleen.

CULTURES.

Cultures were obtained from the lung direct and from a guinea-pig (No. 2187) which had been inoculated with the lung.

The strain raised directly from the lung produced a luxuriant warty and pigmented growth on glycerin-serum, much thicker than on serum alone.

On glycerin-agar a thick creamy wrinkled and almost uniform layer was formed.

On potato the growths were of moderate thickness, greyish-white warty or wrinkled, the raised parts having a yellow colour.

The surface of broth was quickly covered with a very thick creamy coarsely wrinkled pellicle; a pellicle with similar characters was produced on glucose milk.

The growth on gelatine broth was not so good as on glycerin broth, three quarters only of the surface being covered with a greyish semi-opaque uniform finely wrinkled membrane.

The strain derived from the guinea-pig gave practically identical results on the above media.

INOCULATION EXPERIMENTS.

(*a*) With original material.

Calves.—Two calves, Nos. 1131 and 1141, were inoculated subcutaneously with an emulsion made from the lung, a dose estimated to contain 195 million tubercle bacilli being given in each case.

Calf 1141 was killed when well 93 days after inoculation.

The local tumour was fibroid with thick caseo-pus in a central cavity; the left prescapular gland contained four large nodules of similar character. One cervical gland was caseo-calcareous. Two abdominal glands contained one or more calcareous foci.

Calf 1131 was killed after 366 days; there was an elastic fibroid local tumour with a cheesy gritty caseous centre, in the adjacent prescapular gland there was as nodular mass (2 cm.) similar on section, and one small grey tubercle was seen in the lung. A guinea-pig inoculated with an emulsion of the bronchial gland became tuberculous.

Rabbits.—Four rabbits, Nos. 1096–99, were inoculated with the emulsion of the lung, two intraperitoneally and two subcutaneously. One of the former died in a few days of severe psorospermosis. The remaining three animals were killed 114 days after inoculation, and showed slight chronic tuberculosis.

Dogs.—Two young puppies, Nos. 19 and 21, were inoculated intraperitoneally with the emulsion of the lung, a dose estimated to contain 97,500,000 tubercle bacilli being given in each case.

Both were killed when in good health after 140 days and 165 days respectively and were found to have generalised tuberculosis of a chronic and apparently retrogressive type.

Guinea-pigs.—Six guinea-pigs, Nos. 2184–2187 and 2192–2193, were inoculated with emulsions derived from the lung. All died of tuberculosis in periods varying from 60 to 121 days. One guinea-pig, No. 2194, inoculated with an emulsion made from the spleen, was found to have chronic general tuberculosis when killed 121 days later.

(*b*) With cultures.

Calf.—One calf, No. 1209, was inoculated subcutaneously with 50·0 mg. of culture derived from the lung. It was killed when in good health 126 days later, and showed tuberculosis limited to the seat of inoculation and the glands adjacent thereto.

Rabbits.—Four rabbits, Nos. 1255–1258, were inoculated with varying doses of culture derived from the lung, two intravenously, one intraperitoneally, and one subcutaneously.

One intravenous rabbit (dose 1·0 mg.) died in 83 days and showed general tuberculosis (not severe), the other (dose 0·1 mg.) died in 249 days of chronic general tuberculosis. The intraperitoneal rabbit (dose 10·0 mg.) died in 247 days also of chronic general tuberculosis. The subcutaneous rabbit (dose 10·0 mg.) was killed after 725 days and showed very slight tuberculosis of the glands adjacent to the site of inoculation only.

Guinea-pigs.—One guinea-pig was inoculated intraperitoneally and one subcutaneously with 0·1 mg. of culture derived from the lung. Both died of tuberculosis, the former in 43, the latter in 121 days.

SUMMARY.

From the lung of a man aged 33 years, who died of phthisis, a culture was obtained which grows luxuriantly on all media containing glycerin, is slightly virulent for calves and rabbits and virulent for guinea-pigs.

Virulence after Passage.

The virulence of this virus was unchanged after residences in the body of the calf of 478 and 506 days (four calves each) and 512 and 247 days (two calves each).

VIRUS H. 81. "P.W."

TUBERCULOSIS OF THE LUNG.

Original material—The tissues sent to Blythwood were the right lung, the spleen, and the mesenteric glands.

HISTORY OF PATIENT.

The patient was a man aged 33 years, admitted to hospital on January 3, 1907.

On admission he was extremely emaciated; both apices were flattened and the interspaces were sunken. There was less movement on the left side than on the right. The percussion note was impaired over the whole of the right lung and posteriorly there were increased vocal resonance, tubular breathing and crepitations all over. At both apices there were all the signs of advanced consolidation and cavitation.

On January 27, 1907, 24 days after admission, the patient died.

POST-MORTEM NOTES AND DESCRIPTION OF MATERIAL RECEIVED AT BLYTHWOOD.

Lungs.—The right lung was heavy and showed on the surface some thin yellow fibrino-purulent membranous patches; the middle lobe was adherent to the upper and lower lobes, a yellow fibrinous layer intervening.

The upper lobe was consolidated and caseating, and contained several irregular cavities; one near the apex was rather large, and communicated with bronchi as well as with several of the smaller cavities; the internal surface was covered with pus which in a smear preparation showed numerous tubercle bacilli and very numerous organisms (cocci and bacilli) stained blue.

The middle lobe was composed partly of solid caseating tissue, showing recent cavity formation, and partly of congested and pneumonic lung tissue.

The lower lobe in its upper part was pneumonic, and showed caseous patches, groups of caseous tubercles, and a few irregular cavities filled with caseous débris; lower down the lobe became less and less congested, and contained fewer caseous tubercles occurring chiefly in groups.

† The left lung was similar to the right.

† Both lungs were adherent to the pleura, the left more so than the right.

† *Bronchial Glands.*—The bronchial glands were not examined.

† *Peritoneum.*—Normal.

† *Liver.*—Normal.

Spleen.—The spleen was enlarged, soft and dark red; no tubercles were seen on section.

† *Intestines.*—Normal.

Mesenteric Glands.—The mesenteric glands were not apparently enlarged; two contained each an irregular stony hard calcareous nodule, about the size of a barley grain.

Microscopical Examination.

Emulsions of Lung.—Tubercle bacilli were numerous in each of four separate emulsions examined.

Pus from Lung Cavity.—Tubercle bacilli were numerous, and there were very numerous other micro-organisms.

Emulsion of Nodule from Mesenteric Gland.—One (?) tubercle bacillus seen, short.

Calves, rabbits, and guinea-pigs were inoculated with various emulsions prepared from the lung.

One guinea-pig was inoculated with an emulsion of the spleen, and two with an emulsion of a mesenteric gland nodule.

CULTURES.

Four tubes of the egg medium were sown with an emulsion made from one of the calcareous nodules from a mesenteric gland; all the tubes remained sterile.

Cultures of the tubercle bacillus were isolated from the lung direct and from two guinea-pigs, one of which had been inoculated with an emulsion made from the lung, the other with an emulsion made from the spleen.

All the strains grew luxuriantly on the differential media, their cultural characters being practically identical.

Growth on glycerin-serum was thick creamy and wrinkled, and was much more abundant than on the same serum without glycerin.

On glycerin-agar and glycerin-potato thick creamy wrinkled growths were produced.

On broth the pellicles were uniform very thick creamy wrinkled and sometimes warty.

The growths obtained on gelatine were not so good as those on broth.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Calves.—Two calves, Nos. 1129 and 1145, were inoculated with an emulsion made from the lung, the estimated dose in each case being over 3000 million.

No. 1129 was killed when well 108 days after inoculation and showed tuberculosis limited to the seat of inoculation and the gland adjacent to it.

No. 1145 was killed when well 100 days after inoculation; it showed a large ulcerated fibroid tumour, a cystic prescapular gland containing pus and caseo-calcareous masses, and sparsely scattered caseo-calcareous or calcareous tubercles in the lungs, liver, spleen, and nearly all the lymphatic glands (in the thoracic glands caseo-calcareous nodules were numerous).

Rabbits.—Four rabbits were inoculated, three intraperitoneally and one subcutaneously, with emulsions made from the lung. All died of acute or sub-acute infections in from 15 to 49 days, and showed no signs of tuberculosis.

Guinea-pigs.—Six guinea-pigs, Nos. 2207–2208 and 2212–2215, were inoculated intraperitoneally with emulsions made from the lung. All died of tuberculosis in periods varying from 15 to 66 days.

One guinea-pig, No. 2209, was inoculated intraperitoneally with an emulsion made from the spleen; it died in 33 days of general tuberculosis.

Two guinea-pigs, Nos. 2210 and 2211, were inoculated with an emulsion made from the calcareous nodule in a mesenteric gland. They were killed after 72 and 34 days respectively; no tuberculosis was found in either.

(*b*) With cultures.

Bovines—One calf, No. 1211, was inoculated subcutaneously with 50·0 mg. of culture derived from the lung. It was killed when well 124 days later and was found to have a cystic tumour at the seat of inoculation and a few calcareous lesions in the left prescapular gland; the prepectoral gland was fibro-calcareo-caseous throughout; in the lungs were three small grey tubercles.

Chimpanzee.—One chimpanzee, No. 7, was inoculated subcutaneously with 0·00001 mg. of culture derived from the lung. It died of general tuberculosis 92 days later.

Rhesus Monkeys.—Three rhesus monkeys, Nos. 95, 97, and 99, were inoculated subcutaneously with 1·0, 0·001, and 0·00001 mg. respectively of the same culture; they died of general tuberculosis in 45, 48, and 49 days.

Horse.—Horse 1 was inoculated subcutaneously with 50·0 mg. of culture derived from the lung. It was killed 116 days later and showed local tuberculosis only.

Dogs.—Dog 43 (puppy) was inoculated intravenously with 1·0 mg. of culture derived from the lung. It died 33 days later. The lungs were air-containing, and showed numerous small tubercles with opaque centres. The bronchial and portal glands were in an early stage of caseation. The spleen was very large and showed numerous opaque points and foci. Tubercle bacilli were numerous in the liver, spleen, and infected glands; none were seen in smears from a kidney or suprarenal body.

Cat.—Cat 47 was inoculated sub-peritoneally with 10·0 mg. of culture derived from the prescapular gland of calf 1145; it died of causes other than tuberculosis in 74 days and showed a caseous local lesion and no tuberculosis elsewhere.

Rabbits.—Four rabbits were inoculated with various doses of culture derived from the lung, two intravenously, one intraperitoneally, and one subcutaneously.

No. 1251 inoculated intravenously with 1·0 mg. died in 81 days and showed slight tuberculosis of the lungs and kidneys only, the disease being insufficient to account for death. The remaining three were killed when well after 161 days, and showed chronic retrogressive tuberculosis of the usual type.

Guinea-pigs.—Two guinea-pigs were inoculated, one subcutaneously and one intraperitoneally, with 0·1 mg. of culture derived from the lung. They died of tuberculosis in 137 and 35 days respectively.

Four guinea-pigs were inoculated, two intraperitoneally and two subcutaneously, each with 0·00001 mg. of culture derived from the same source. All died of general tuberculosis in periods varying from 169 to 320 days.

Rats.—Two rats were inoculated, one intraperitoneally and the other subcutaneously, with 10·0 mg. of culture derived from the lung. The former died of acute tuberculosis in 58 days, the latter died in 454 days and showed no macroscopic tuberculosis and no apparent cause for death; T.B. were seen in a smear from the lung.

Mice.—Two mice were inoculated, one intraperitoneally and one subcutaneously, each with 50·0 mg. of culture derived from the lung. The former died of acute tuberculosis in 12 days. The latter died in 61 days and showed local tuberculosis; the cause of death was not apparent; T.B. were seen in a smear from the spleen.

Parrots.—Two parrots were inoculated intravenously (doses 2·0 and 10·0 mg.) with culture derived from the lung.

The latter died in 9 days; the lungs were dark red in colour, oedematous and almost entirely airless. T.B. were numerous in smears from the lung, liver, spleen, and kidney. The former died of general tuberculosis after 20 days.

Three parrots were subsequently inoculated, one intravenously, one intraperitoneally and one intramuscularly with the culture derived from the lung. The intravenous parrot (dose 0·1 mg.) was killed after 298 days and showed a few minute grey tubercles in the liver and kidneys, and four tubercles on the peritoneum; tubercle bacilli were seen in a smear from the lung. The intraperitoneal parrot (dose 1·0 mg.) died of tuberculous peritonitis in 129 days; the parrot inoculated intramuscularly (dose 10·0 mg.) was killed after 269 days and showed slight general tuberculosis.

Fowl.—One fowl was inoculated intravenously with 50·0 mg. of the culture derived from the lung; it was killed after 183 days and showed no sign of tuberculosis; an emulsion of the lung and spleen produced tuberculosis in a guinea-pig.

SUMMARY.

From the lung of a man aged 33, who died of phthisis, a culture was isolated which grows luxuriantly on all media containing glycerin, is virulent for chimpanzees, monkeys, and guinea-pigs, and has only slight virulence for calves, rabbits, and horses.

A culture was also isolated from the man's spleen through the guinea-pig; this strain was identical in cultural characters with the lung strain.

Virulence after Passage.

The virulence of this virus was unchanged after residences in the body of the calf of 497 days (seven calves), 459 days (four calves), and 452 days (three calves).

VIRUS H. 82. "G.F."

GENERAL TUBERCULOSIS PRIMARY IN THE ALIMENTARY TRACT.

Original material—The specimens sent were the cervical and the mesenteric glands, the lungs, the bronchial glands, and the heart and spleen.

HISTORY OF PATIENT.

The patient was a boy aged four years who was admitted to hospital on February 4, 1907, with signs of advanced phthisis in both lungs and of pericarditis. He was taken ill at Christmas 1906 with cough and fever, and had slowly grown worse. He was very ill on admission and died two days later, on February 6, 1907.

The child was an orphan and no further personal or family history was obtainable.

POST-MORTEM NOTES AND DESCRIPTION OF TISSUES RECEIVED AT BLYTHWOOD.

Intestines.—Healthy.

Cervical Glands.—One cervical gland in the middle of the neck below the thyroid bodies contained a dense fibro-caseous nodule about the size of a barley grain. (There were no scars in the neck.†)

Mesenteric Glands.—The mesenteric glands, not apparently enlarged, contained altogether about a dozen dense opaque white caseous nodules ranging in size from a millet seed to that of a barley grain; some were distinctly calcareous, others showed foci of softening.

Lungs.—The right lung was collapsed and had very little air-containing tissue on the surface of the upper lobe there was a thick yellow fibrinous patch which could be peeled off, though with some difficulty.

The left lung was congested; near the apex of the left upper lobe there was a firm yellowish-white caseous nodule, 1 cm. in diameter, beginning to soften in the centre, surrounded by a thin fibrous capsule; the nodule was situated just under the pleura, which at this place was thickened and roughened. Scattered about in the substance of this lobe were grey miliary tubercles slightly opaque in the centre.

Bronchial Glands.—One interbronchial gland buried in the parenchyma of the left upper lobe and situated near the caseous nodule was enlarged (1 cm. in diameter) caseous throughout and softened in the centre. The left praetracheo-bronchial glands (four in number) were enlarged, the largest measuring a little over 1 cm. in diameter, and fused together; on section they were caseous throughout, those near the lung being softened, those more remote dense creamy white and showing opaque whitish foci (?) of early calcification; one small gland contained a few discrete tubercles. Other bronchial glands were normal.

Heart.—The parietal and visceral pericardium was uniformly covered with a thick shaggy and villous fibrinous membrane; the heart muscle under the membrane for a depth of about 1 mm. had a yellowish color (? result of myocarditis); the endocardium and valves were normal. A culture tube sown with some of the fibrinous material from the surface of the heart showed in 24 hours, amongst other organisms, chains of streptococci.

Spleen.—The spleen showed some patches of fibrin on the convex surface; on section about half a dozen firm yellow caseous tubercles ranging in size from a pin's head to that of a millet seed were found in the pulp; the larger ones were caseous throughout, the smaller ones had narrow grey margins.

†*Liver.*—Healthy.

†*Kidneys.*—Healthy.

†*Peritoneum.*—Healthy.

†*Meninges of Brain.*—Not examined.

†*Bones and Joints.*—Healthy.

Microscopical Examination.

Lung, Smears from Caseous Nodule (two films examined).—Tubercle bacilli numerous in both.

Bronchial Gland, Caseous Material from (two films examined).—Tubercle bacilli numerous in both.

Mesenteric Glands, Nodules from (three emulsions were made, and examined microscopically).—No tubercle bacilli seen in any.

Cervical Gland, Nodule from.—Tubercle bacilli.

Spleen, Tubercle from.—Tubercle bacilli, few seen.

Pericardium, Fibrinous Material from.—No tubercle bacilli. A few chains of cocci as well as bacilli.

Guineapigs were inoculated with emulsions of the mesenteric glands, the bronchial gland, the lung, and the spleen; *Rabbits* with the mesenteric gland, the bronchial gland and the lung.

CULTURES.

Cultures were sown direct from a mesenteric gland, the spleen, the lung, and a bronchial gland.

The tubes sown from the mesenteric gland, the bronchial gland and the spleen remained sterile.

On all the tubes sown from the lung numerous staphylococcus colonies appeared within a few days. On further incubation on one of the tubes a few colonies of the tubercle bacillus developed; a pure subculture was not obtained from any of these colonies.

Cultures of the tubercle bacillus were obtained from guineapig 2239 inoculated with an emulsion of a mesenteric gland, and guineapig 2242 inoculated with an emulsion from the lung.

Both these strains have exhibited practically identical characters on the differential media.

On glycerin-serum growth was more abundant than on serum, presenting in one case raised yellow ridges and patches.

On glycerin-agar a moderately thick creamy wrinkled layer was formed in each case.

On potato the growths were moderately thick creamy yellow wrinkled and warty.

Each strain produced on broth a very thick creamy wrinkled and warty pellicle.

On gelatine the mesenteric gland strain formed a uniform wrinkled semi-opaque greyish membrane over the whole surface.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guineapigs.—Four guineapigs, Nos. 2236 to 2239, were inoculated intraperitoneally with emulsions made from nodules in the mesenteric glands. Two died in 83 and 92 days respectively and showed general tuberculosis; in one, killed after 28 days, slight tuberculosis of the omentum only was found; the fourth, killed after 96 days, showed general tuberculosis.

Two guineapigs, Nos. 2242–2243, were inoculated intraperitoneally with an emulsion of the caseous nodule from the lung. The former was killed after 28 days and showed very slight tuberculosis; the latter died of general tuberculosis in 82 days.

Two, Nos. 2240–2241, were inoculated intraperitoneally with an emulsion of the caseous material from a bronchial gland. The former, killed after 28 days, showed two tubercles (?) in the omentum only; the latter was killed after 96 days and found to be healthy.

A guineapig, No. 2235, inoculated intraperitoneally with an emulsion of the spleen, was also killed after 96 days and found to be healthy.

Rabbits.—Two rabbits, No. 1159–1160, were inoculated intraperitoneally with an emulsion made from a nodule in a mesenteric gland. The former, killed after 98 days, showed a few minute tubercles in the omentum only; the latter died after 3 days from causes which could not be ascertained.

One rabbit, No. 1162, was inoculated intraperitoneally with the emulsion of the lung, and one, No. 1161, with the emulsion of the bronchial gland; the former died in 42 days of pseudo-tuberculosis and showed no sign of tuberculosis; the latter killed after 98 days was also free from tuberculosis.

(*b*) With culture.

Rabbits.—Four rabbits were inoculated, two intravenously and two subcutaneously, with various doses of culture derived from the mesenteric glands through guineapig 2239.

One rabbit inoculated intravenously (1·0 mg.) died in 75 days of tuberculosis of the lungs (severe) and kidneys (slight); the other (0·1 mg.) died in 158 days of purulent pleurisy and showed tuberculosis of the lungs, kidneys and one bronchial gland (not severe). The 2 rabbits inoculated subcutaneously (10·0 and 1·0 mg.) were killed after 168 days and showed besides a local lesion chronic tuberculosis of the lung and in one case also two tubercles in the kidneys.

Five rabbits were inoculated, two intravenously, one intraperitoneally, and two subcutaneously, with various doses of culture derived from the lung through guineapig 2242.

One intravenous rabbit (0·1 mg.) died in 36 days and showed tuberculosis of the lungs and kidneys, not sufficient to account for death; the intraperitoneal rabbit (10·0 mg.) died in 22 days of early general tuberculosis complicated by pseudo-tuberculosis; and one subcutaneous animal (dose 50·0 mg.) died in 39 days and showed local tuberculosis, and caseous masses apparently not tuberculous occupying the right caudal lobe of the lung.

The two remaining rabbits, one intravenously (1·0 mg.) and one subcutaneously (10·0 mg.) inoculated, were killed after 117 days; the former showed slight tuberculosis of the lungs and kidneys, and the right epididymis was greatly enlarged and composed of grey nodules caseous in the centre; the latter showed local tuberculosis and slight tuberculosis of the lungs only.

Guineapigs.—Four guineapigs were inoculated, two intraperitoneally and two subcutaneously, with culture derived from the lung (doses 1·0 and 0·1 mg.). One died after 24 days of general tuberculosis complicated by pseudo-tuberculosis of the mesenteric glands; the others all died of uncomplicated general tuberculosis in from 76 to 161 days.

SUMMARY.

From the mesenteric gland and the lung of a boy aged 4 years, who died of general tuberculosis primary in the alimentary tract, cultures were obtained which grow luxuriantly on media containing glycerin, are virulent for the guineapig, and only slightly virulent for the rabbit.

VIRUS H. 83. "G.C."

GENERAL TUBERCULOSIS PRIMARY IN THE ALIMENTARY TRACT.

Original material—The specimens sent were the cervical and the mesenteric glands, portions of the lung, liver, spleen, and brain, and the bronchial glands.

HISTORY OF PATIENT.

The patient was a girl aged one year and nine months who was admitted to hospital on January 29, 1907, for cough and wasting.

There was a history of tuberculosis in the family, the maternal grandmother and two aunts having died of "consumption." The father and mother were healthy.

The child was breast-fed. She was always delicate, had had measles, and had been to various hospitals.

The cough began three weeks ago with rapid breathing and convulsion.

On admission the child was pale and thin. There was slight retraction of the head. There was an occasional short cough. The respiration was frequent (42 per minute), but there was no cyanosis. The heart was normal. Lungs: impaired note at base behind, râles over both bases. The liver was felt to be slightly enlarged. The temperature was 102·4° F.; the pulse 156; the respiration 42.

The child gradually became unconscious, got convulsions, and died on February 21, 1907.

POST-MORTEM NOTES AND DESCRIPTION OF MATERIAL RECEIVED AT BLYTHWOOD

†*Intestines.*—The intestines showed no ulceration.

Cervical Glands.—One, (?) slightly enlarged, showed on section irregular firm caseous patches; another had in the cortex a small soft yellowish caseous patch; a third was normal. (There were no scars in the neck.†)

Mesenteric Glands.—The mesenteric glands, not apparently enlarged, contained altogether about a dozen opaque whitish nodules, the largest a little larger than a millet seed.

Bronchial Glands.—Three interbronchial glands, buried in the substance of the lung, were enlarged, caseous throughout and beginning to soften. Two intertracheo-bronchial glands, one 2 cm. in greatest diameter, were enlarged and caseous throughout, the largest softened in the centre.

Lung.—The piece of lung contained numerous grey miliary tubercles, a few slightly opaque in the centre; in one margin there was a consolidated lobule, grey and containing miliary tubercles. †Numerous similar tubercles were seen throughout both lungs; there was some consolidation of the right apex; no cavities were seen.

Spleen.—The spleen showed on the surface numerous flattened grey tubercles, forming in places flat grey patches. In the pulp there were numerous miliary tubercles, some caseous in the centre, others grey and translucent.

Liver.—The liver contained scattered greyish-white submiliary tubercles.

†*Kidneys.*—There were one or two tubercles in the kidneys.

†*Parietal Peritoneum.*—Normal.

Brain.—The meninges were studded with small grey tubercles.

Bones and Joints.—Normal.

Microscopical Examination.

Cervical Gland, Emulsion of.—Tubercle bacilli.

Mesenteric Gland, Smear from.—Tubercle bacilli.

Mesenteric Glands, Emulsion of.—No tubercle bacilli seen.

Inter-bronchial Gland, Emulsion of.—Tubercle bacilli fairly numerous.

Intertracheo-bronchial Gland, Emulsion of.—Tubercle bacilli.

Spleen, Emulsion of.—No tubercle bacilli seen.

Meninges, Emulsion of.—Tubercle bacilli fairly numerous.

Guineapigs were inoculated with emulsions of the mesenteric glands, the bronchial gland, the spleen, and the meninges; *Rabbits* with the mesenteric glands, the bronchial gland, and the spleen.

CULTURES.

Cultures were obtained direct from the bronchial glands (inter-bronchial and tracheo-bronchial) and a mesenteric gland; all the tubes sown from a cervical gland became contaminated.

Cultures were also obtained through the guineapig from the meninges (two strains), and the spleen (one strain).

Five strains altogether—one from an inter-bronchial gland, one from a mesenteric gland, two from the meninges, and one from the spleen—have been tested on the differential media; they have all grown well and have exhibited practically identical characters.

Growth on glycerin-serum was very luxuriant, deeply pigmented, and occasionally wrinkled or warty.

On glycerin-agar each strain produced a thick creamy continuous wrinkled layer.

On glycerin-potato growth was luxuriant raised yellow (on some of the tubes the colour was rosy red, due probably to the litmus) and highly wrinkled.

Thick creamy-white wrinkled and warty pellicles were produced by three of the strains on broth and by four on gelatine; no growth was obtained from one of the "meninges" strains either on broth or gelatine.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guineapigs.—Two guineapigs, Nos. 2270 and 2271, were inoculated intraperitoneally with an emulsion made from the mesenteric glands; two, Nos. 2272 and 2273, intraperitoneally with an emulsion made from the intertracheo-bronchial gland; two, Nos. 2268 and 2269, intraperitoneally with an emulsion made from the meninges; and two, Nos. 2274 and 2275, intraperitoneally with an emulsion of the spleen.

No. 2272, killed after 64 days, was found to have chronic general tuberculosis; all the others died of general tuberculosis in periods ranging from 16 to 60 days.

Rabbits.—Rabbit 1188 was inoculated intraperitoneally with the mesenteric gland emulsion; No. 1189 intraperitoneally with the bronchial gland emulsion; and No. 1190 intraperitoneally with the emulsion of the spleen.

All were killed after 96 days. 1188 showed a few very minute tubercles in the omentum and two tubercles in the lungs; in 1189 there was no sign of tuberculosis; 1190 showed caseous miliary tubercles in the omentum and one tubercle in the lung.

(*b*) With culture.

Rabbits.—Five rabbits were inoculated, two intravenously, one intraperitoneally, and two subcutaneously, with various doses of culture derived from a mesenteric gland.

One rabbit inoculated intravenously and two inoculated subcutaneously died, each after 38 days, and showed slight tuberculosis, insufficient to account for death. The rabbit inoculated intraperitoneally died in 16 days of pseudo-tuberculosis of the mesenteric glands; there was slight tuberculosis of the peritoneum. The remaining rabbit (intravenous, dose 0·1 mg.) was killed after 126 days and showed slight tuberculosis of the lungs and kidneys.

A similar series of rabbits was inoculated with culture derived from a bronchial gland.

The rabbits inoculated intravenously (doses 1·0 and 0·1 mg.) died in 13 and 22 days, the former showed early tuberculosis of the lungs, the latter general tuberculosis and pseudo-tuberculosis of the mesenteric glands. The rabbit inoculated intraperitoneally died of gastritis in five days. Of the two inoculated subcutaneously (dose 50·0 mg. each) one died after 25 days and showed slight tuberculosis insufficient to account for death, the other was killed after 126 days and showed local tuberculosis only.

Guineapigs.—Two guineapigs were inoculated with each of the two cultures—mesenteric gland and bronchial gland—one intraperitoneally and one subcutaneously in each case, the doses being either 1·0 or 0·1 mg. All died of general tuberculosis in from 38 to 120 days; in one guinea-pig (intraperitoneal, died in 95 days) the disease was complicated by pseudo-tuberculosis.

SUMMARY.

From a case of general tuberculosis primary in the alimentary tract, in a child aged one year and nine months, cultures were isolated from the mesenteric and bronchial glands, the meninges and the spleen.

All the strains grow luxuriantly on media containing glycerin, and two have been shown to be virulent for the guinea-pig and to possess low virulence for the rabbit.

VIRUS H. 86. "C.P."

TUBERCULOSIS PRIMARY IN THE LUNG.

Original material—The specimens sent were portions of the lung, liver, spleen, kidney, and brain, and the bronchial and mesenteric glands.

HISTORY OF PATIENT.

The patient, a boy aged three years and seven months, was admitted to hospital on April 21, 1907, suffering from tuberculous meningitis.

The father and mother were healthy; the former had had pleurisy two years previously. There were five other children, all of whom were healthy. A grandmother had died of phthisis.

Previous History.—The child was breast-fed for 18 months. He had an abscess behind the ear when 7 weeks old and rickets 12 months ago. He had always been a strong child.

Present Attack.—He was taken ill suddenly in his perambulator on April 16; was taken home and was sick; the next day he complained of pains in head and ear and was again sick; he continued in this condition until admission.

On admission the child complained of pain in the head; he was in a semi-comatose condition; the pupils re-acted to light.

The following day, April 22, he was drowsy and comatose; twitching of the face and arms was noticed. Lumbar puncture was performed and the cerebro-spinal fluid examined microscopically; a few tubercle bacilli were seen in the smear preparation. At 5 p.m. the left parietal region was trephined; congested brain bulged out, but no tubercles were seen.

After the operation the temperature rose and the patient sank and died next day, April 23, 1907.

POST-MORTEM NOTES AND DESCRIPTION OF MATERIAL RECEIVED AT BLYTHWOOD.

Lung.—The piece of lung contained a cheesy caseous nodule 1 cm. in diameter, slightly gritty from calcification. †There was no tuberculosis elsewhere in the lungs.

Bronchial Glands.—Two were sent; these were slightly enlarged and contained each a friable yellowish-white caseous mass slightly gritty from calcification, the largest rather more than 1 cm. in diameter.

There were also two small glands, which had been removed from the neck "low down," probably belonging to the peri-tracheo-bronchial group of glands; one of these was partly caseous and slightly gritty from calcification; another showed a minute yellow focus in the cortex.

Meninges.—The meninges showed fairly numerous minute grey foci.

The other organs were normal.

†There were no scars in the neck.

Microscopical Examination.

Emulsion of Lung Nodule.—Two tubercle bacilli seen.

Emulsion of Bronchial Gland.—One tubercle bacillus seen.

Emulsion of Meninges.—No tubercle bacilli seen.

One rabbit and two guineapigs were inoculated with each of the above emulsions.

CULTURES.

Cultures were sown on the egg medium direct from the lung and a bronchial gland. All the tubes remained sterile.

Of the guineapigs inoculated with the original material the two which received an emulsion made from the meninges were the only ones to develop tuberculosis.

A culture was obtained from each of these guineapigs.

On the differential media the two strains have shown identical cultural characters.

On glycerin-serum growth was much more abundant than on serum, thick opaque yellow patches being formed.

On glycerin-agar in each case a thick creamy wrinkled layer was produced. The growths on potato were also thick yellow and wrinkled.

The surface of a flask of broth (500 cc.) quickly became covered with a moderately thick finely-wrinkled pellicle with a creamy tinge.

Good growths were also obtained on broth and gelatine broth in the 6-oz. medicine bottles.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guineapigs.—Two guineapigs, Nos. 2395 and 2396, were inoculated intraperitoneally with an emulsion made from the meninges; they died of general tuberculosis in 23 and 25 days.

Two, Nos. 2397 and 2398, were inoculated, one subcutaneously the other intraperitoneally, with an emulsion made from the lung nodule; the former died after one day (cause of death not determined); the latter was killed after 41 days and found to be free from tuberculosis.

Two, Nos. 2399 and 2400, were inoculated, one subcutaneously the other intraperitoneally, with an emulsion made from a bronchial gland; both were killed 41 days later and were found to be perfectly healthy.

Rabbits.—Three rabbits were inoculated subcutaneously, one with each of the three emulsions. No. 1275 (meninges) died in four days of an acute infection. No. 1276 (lung) and No. 1277 (bronchial gland) were killed after 80 days and found to be free from tuberculosis.

(*b*) With culture.

Rabbits.—Six rabbits were inoculated with varying doses of culture derived from the meninges through guineapig 2395, two intravenously, two intraperitoneally, and two subcutaneously.

One intravenous rabbit (dose 1·0 mg.) died in 167 days and showed chronic retrogressive general tuberculosis; the other (0·1 mg.) was killed after 221 days and showed chronic tuberculosis of the lungs, kidneys, some joints, and the muscles.

The rabbits inoculated intraperitoneally (doses 10·0 and 1·0 mg.) were killed after 220 and 221 days; one showed slight chronic tuberculosis of the peritoneum, lungs and kidneys, and the epididymes contained soft caseo-purulent areas; the other local tuberculosis and very slight tuberculosis of the lungs and a kidney.

One subcutaneous rabbit (50·0 mg.) died in 206 days and showed caseo-purulent nodules at the seat of inoculation, one caseous tubercle in the nearest gland, and three small caseous nodules in the lungs; death was due to injuries. The other (10·0 mg.) was killed after 220 days and showed several large thin-walled cysts at the seat of inoculation, calcareous grains in the nearest glands, and no tuberculosis elsewhere.

Guineapigs.—Two guineapigs were inoculated with 1·0 mg. of culture derived from the meninges, one intraperitoneally, the other subcutaneously.

The one died of general tuberculosis in 29 days, the other of chronic general tuberculosis in 83 days.

Hedgehog.—One hedgehog was inoculated subcutaneously with 10·0 mg. of culture derived from the meninges. It died 55 days later; general tuberculosis was produced by the inoculation, but death was the result of a secondary infection caused by organisms which had entered the body apparently through an abrasion on the nose.

SUMMARY.

From the meninges of a child aged three-and-a-half years, who died of tuberculous meningitis, a culture was isolated which grows luxuriantly on media containing glycerin, is virulent for the guinea-pig and only slightly virulent for the rabbit.

In emulsions of the lung nodule and of the bronchial glands bacilli morphologically identical with tubercle bacilli were demonstrated, but guinea-pigs inoculated with the emulsions did not develop tuberculosis, and culture tubes sown from them remained sterile.

VIRUS H. 87. "W.D."

TUBERCULOSIS OF THE SUPRARENAL BODIES.

Original material—The material in this case was a guineapig which had been inoculated subcutaneously with an emulsion made from a tuberculous suprarenal body.

HISTORY OF PATIENT.

The patient, a young man aged 21, had never been strong. He first noticed darkening of the colour of the skin nine months previously; this was followed by vomiting, vertigo, headache, and progressive weakness.

He was admitted to hospital on February 6, 1907.

General condition. — Persistent vomiting, great asthenia.

Skin.—Bronze pigmentation of nipples, mucous membrane of mouth, glans penis, axillae, and groins; mole-like spots on shoulders.

Temperature.—Subnormal (maximum, 97·2° F.).

Respiration.—16.

Heart.—Pulse, 100. Heart sounds feeble, with basal systolic.

Urine.—Contained a trace of albumen; no excess of pigment.

Eyes.—Fundus oculorum, normal.

Blood.—Haemoglobin, 100 per cent.; Xanthocytes, 5,100,000, ran up to 7,325,000; no leucocytosis.

Glands.—Enlarged glands in the left axilla and on the left side of neck.

Three days later, on February 9, 1907, the patient died.

POST-MORTEM NOTES.

†Profound general pigmentation.

†Congestion of brain.

†*Lungs.*—On the right side there were old universal pleural adhesions; the lung substance was normal. On the left side the diaphragmatic surface showed fibro-caseous nodules and emphysematous bullae. In the apex of the left lower lobe there was a focus of tubercle the size of a hazelnut.

†*Heart.*—Muscle flabby; endocardium normal. Pale thrombi in right auricle.

†*Peritoneum.*—There was black pigment in the visceral and parietal layers, and the mesentery showed oval splash-like black dots. The appendices epiploicae were pigmented.

†*Liver.*—Shotty nodules on parietal surface; some perihepatitis.

†*Pancreas.*—Normal.

†*Suprarenal Bodies.*—In both there was typical fibro-caseous change (sections showed homogeneous coagulation necrosis); the left was calcareous.

MATERIAL RECEIVED AT BLYTHWOOD.

The material received at Blythwood was a guinea-pig which had been inoculated with an emulsion made from a suprarenal body. The guinea-pig and the clinical and post-mortem notes were sent by Dr. Warrington.

The guinea-pig was killed on April 26, 1907, 76 days after inoculation.

Post-Mortem Examination of the Guinea-pig.

There was a clean ulcer on the right side of the abdomen; the right inguinal glands were much enlarged and on section were composed of dense translucent fibroid tissue containing cavities filled with caseo-pus. An inguinal gland on the left side was slightly enlarged and partly caseous. The right iliac glands were enlarged and indurated, and showed some irregular caseous patches. The portal glands were similar, but the caseous patches were smaller. The spleen contained one hempseed-sized grey nodule and a few smaller ones. The liver showed scattered grey nodules of various sizes. The lungs contained a few sparsely scattered grey miliary tubercles. Other organs and glands appeared normal.

A few tubercle bacilli were seen in emulsions made from the inguinal and from the iliac glands.

A rabbit was inoculated with an emulsion of the inguinal glands, and one with an emulsion of the iliac glands. A guinea-pig was also inoculated with the former emulsion.

CULTURES.

A culture was obtained from one of the iliac glands of the guinea-pig which had been inoculated by Dr. Warrington with material from a tuberculous suprarenal body.

On glycerin-serum the culture produced a much more luxuriant growth than on serum alone.

On glycerin-agar the growth was thick wrinkled and cream-coloured.

On potato a moderately thick yellowish warty layer was formed.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Rabbits.—One Rabbit, No. 1279, was inoculated subcutaneously with an emulsion made from the inguinal glands of the guinea-pig, and another, No. 1278, with an emulsion made from the iliac glands.

Both were killed 90 days later; the former showed a local lesion only, the latter a local lesion and slight tuberculosis of the lungs.

Guineapig.—One guinea-pig, No. 2401, was inoculated subcutaneously with an emulsion of the inguinal glands. It was killed after 99 days and found to have chronic general tuberculosis.

(*b*) With culture.

Calf.—One calf, No. 1253, was inoculated subcutaneously with 50·0 mg. of culture derived from the suprarenal body through a guineapig. It was killed 102 days later, and showed a small cyst at the seat of inoculation, two small fibro-calcareous nodules in the adjacent prescapular gland and scattered calcareous tubercles in one mesenteric and the ileo-colic glands.

Pigs.—Two pigs, Nos. 91 and 95, were inoculated subcutaneously with culture derived from the same source, the former receiving 50·0 mg., the latter 40·0 mg.

Pig 91 was killed after 100 days, and showed a small cystic tumour at the seat of inoculation, and caseous nodules and tubercles in the adjacent glands; there were also a few scattered tubercles and two small groups of nodules (the majority with caseous gritty centres) in the lungs just under the pleura.

Pig 95, killed after 104 days, showed a small cyst at the seat of inoculation, a few small soft caseous gritty nodules in the adjacent glands, and a few caseo-calcareous tubercles in one ventral mediastinal gland.

Rabbits.—A series of six rabbits were inoculated (two intravenously, two intraperitoneally, and two subcutaneously) with varying doses of the culture obtained from the guineapig; subsequently two more rabbits were inoculated subcutaneously.

One intravenous rabbit (dose 10·0 mg.) died in 26 days and showed fairly numerous submiliary tubercles in the lungs and kidneys and early tuberculosis of the bronchial glands; the other (1·0 mg.) died in 14 days and showed early tuberculosis of the lungs and bronchial glands not sufficient to account for death.

One intraperitoneal rabbit (1·0 mg.) died in 12 days with tuberculosis of the peritoneum only (the cause of death was not apparent); the other (10·0 mg.) was killed after 152 days and showed slight tuberculosis of the omentum and one small nodule in the lung.

Of the four rabbits inoculated subcutaneously, two died in 11 and 15 days of causes other than tuberculosis, and showed a softening local tumour and early caseation of the nearest glands, and in one case a few minute grey tubercles in the lungs; the remaining two (doses 1·0 and 10.0 mg.) were killed after 148 days and showed—one no tuberculous lesions at all, the other a very small local lesion and one small tubercle in the lung.

Guinea-pigs.—Two guinea-pigs were inoculated each with 1·0 mg. of the culture, one intraperitoneally, the other subcutaneously. The former died in 15 days and showed slight general tuberculosis, the latter in 244 days of chronic general tuberculosis.

SUMMARY.

From the tuberculous suprarenal body of a man aged 21, who died of Addison's disease, a culture was obtained which grows luxuriantly on glycerin media, is virulent for the guinea-pig and only slightly virulent for the calf and rabbit.

VIRUS H. 88. "E.L."

PRIMARY ABDOMINAL TUBERCULOSIS.

Original material—The specimens sent were small portions of the lung, spleen, liver, and kidney, and the mesenteric and the bronchial glands.

HISTORY OF PATIENT.

The patient, a girl aged eight years and seven months, was admitted to hospital on March 23, 1907, for pain in the stomach.

A paternal uncle died of phthisis eight years ago; the father and mother were strong and healthy.

The child was breast-fed for 12 months, then fed on Allen & Hanbury's food; for the last five years she had had chiefly cow's milk.

The child had been thin and anaemic for five years. Two years ago she had vomited blood, and there had been occasional vomiting since. Since November 1906 she had complained of pain in the stomach, had had one attack of diarrhœa lasting two weeks, and was now wasting rapidly.

On admission the child was very pale; the abdomen was distended and tense, no fluid or lumps were felt.

The loss of weight continued during April, and there was a little diarrhœa. On April 30 the child died.

POST-MORTEM NOTES AND DESCRIPTION OF MATERIAL RECEIVED AT BLYTHWOOD.

†*Intestines.*—The intestines were very distended with about a dozen constrictions due to cicatrization of circular tuberculous ulcerations.

†*Peritoneum.*—The peritoneal cavity contained a quantity of clear fluid; there was no peritonitis apart from that associated with the ulceration of the intestine.

Mesenteric Glands.—The mesenteric glands were enlarged but were freely moveable one over the other; on section they were firm, had a reddish gelatinous appearance, and contained arranged around the cortices fairly numerous opaque whitish caseous tubercles, the largest rather larger than a millet seed, and a few small irregular caseous patches formed by confluent tubercles.

Lungs.—Normal.

Bronchial Glands.—The bronchial glands were not enlarged, and contained two greyish opaque miliary tubercles.

†*Liver.*—The liver was not enlarged; one doubtful tubercle was seen in it.

Spleen and Kidneys.—Normal.

†*Meninges of Brain.*—Normal.

†*Bones and Joints.*—Normal.

†There were no scars in the neck.

Microscopical Examination.

Bronchial Gland (smear from one tubercle).—Tubercle bacilli fairly numerous.

Emulsion of Mesenteric Glands (two films examined).—Tubercle bacilli scanty.

Guineapigs were inoculated from the mesenteric glands and the bronchial gland. A rabbit was inoculated from the mesenteric glands.

CULTURES.

Cultures were sown from the mesenteric glands direct, two separate emulsions being made; most of the tubes quickly became contaminated; two, however, remained free from contaminating organisms, and showed after two or three weeks numerous minute flat almost transparent colonies of tubercle bacilli; a subculture was made from one of the tubes.

A culture was also obtained from a guineapig (No. 2418) which had been inoculated with an emulsion of the mesenteric glands.

The two strains agree in their cultural characters.

On glycerin-serum the growth was generally more abundant than on serum, and showed white opaque patches, on one tube slightly creamy.

On one tube of glycerin-agar an almost continuous though not quite uniform moist opaque greyish-white wrinkled layer of moderate thickness was produced; on other tubes the growth was less abundant but similar in type.

On potato the growths produced by the same strain varied; on some it was thin greyish-white and glazed; on others a thicker moister layer was produced, showing raised wrinkled or warty patches, not pigmented.

A grey translucent membrane studded with opaque colonies covered the surface of a small bottle of gelatine in two months and then sank; on another bottle a similar pellicle was produced which did not sink.

A small bottle of broth was covered in a fortnight with a thin grey pellicle mottled with whitish patches and streaks; the pellicle grew thicker, the patches assuming a warty or coarsely granular appearance, and then became moist and sank.

On larger quantities of broth and gelatine the pellicles were much thicker, greyish-white, and wrinkled; they showed, however, the same tendency to become moist and sink.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guineapigs.—Two guineapigs, Nos. 2418 and 2419 were inoculated intraperitoneally with an emulsion made from the mesenteric glands. One was killed after 41 days, the other died after 74 days, and both showed general tuberculosis.

One guineapig, No. 2420, inoculated intraperitoneally with an emulsion made from a tubercle in a bronchial gland, was found to be free from tuberculosis when killed 41 days later.

Rabbit.—A rabbit, No. 1285, inoculated subcutaneously with the emulsion of mesenteric glands, died of general tuberculosis in 77 days.

(*b*) With culture.

Calf.—One calf, No. 1271, inoculated subcutaneously with 50·0 mg. of culture derived from the mesenteric glands, died in 45 days of general tuberculosis.

Rabbits.—A series of six rabbits were inoculated (two intravenously, two intraperitoneally, and two subcutaneously) with varying doses of culture derived from the mesenteric glands.

The intravenous and intraperitoneal rabbits (doses 1·0 and 0·1 mg.) all died of general tuberculosis in periods varying from 13 to 27 days.

One subcutaneous rabbit died in nine days, the organs and glands appeared healthy and the cause of death was not ascertained; the other (dose 50·0 mg.) died of general tuberculosis in 50 days.

Guineapigs.—Two guineapigs were inoculated each with 0·1 mg. of culture derived from the mesenteric glands, one intraperitoneally (and partly subperitoneally), the other subcutaneously. They died of general tuberculosis in 28 and 40 days respectively.

SUMMARY.

From the tuberculous mesenteric glands of a child aged 8½ years, who died from multiple stricture of the gut (due to tuberculous ulceration), a culture was isolated which has high virulence for the calf, rabbit, and guineapig.

The culture grows moderately well on artificial media, and resembles the more easy-growing cultures of bovine origin.

VIRUS H. 89. "W.I."

PRIMARY ABDOMINAL TUBERCULOSIS.

Original material—The specimens sent were the mesenteric and the bronchial glands and portions of the lung and brain.

HISTORY OF PATIENT.

The patient, a boy aged four years, was admitted to hospital on June 1, 1907, for persistent abdominal pain and diarrhœa.

The paternal grandmother had phthisis; there was no further history of tuberculosis in the family. There was one other child who was healthy.

The child had been breast fed for 14 months.

Two years ago he was an outpatient at the hospital, suffering from "colitis."

One year ago he had measles and subsequent chill.

The present attack commenced three months ago with abdominal pain which had since continued; during the last three weeks he had had diarrhœa, and cough the last few days. Loss of appetite had been noticed lately. There was no vomiting. During the three months he had been fed on milk only.

On admission the abdomen was distended, but nothing abnormal was detected on palpation. Râles were heard at both apices of the lungs. The temperature was about 100·0° F.

The diarrhœa continued, and on June 6 there was pain and tenderness in the right iliac fossa and a lump was felt in this region. An operation was performed, and the lump was found to be due to a thickened condition of the wall of the intestine.

On June 11, 1907, the child died.

POST-MORTEM NOTES AND DESCRIPTION OF MATERIAL RECEIVED AT BLYTHWOOD.

†*Intestine.*—The intestine was very extensively ulcerated, especially in the first part of the colon.

Mesenteric Glands.—The mesenteric glands were enlarged; some were yellow and caseous practically throughout, others showed yellow patches composed of aggregated yellow tubercles, while others contained a few discrete tubercles or small groups of tubercles in the cortex.

In one of the glands there was a soft caseo-necrotic mass, otherwise the caseous substance was firm and not easily broken down when scraped with a scalpel.

Lungs.—The lungs were closely beset with greyish-white caseous tubercles ranging in size from a pin's head to that of a millet seed; there were no areas of collapse and no cavities.

Bronchial Glands.—The bronchial glands were slightly enlarged and congested, but not caseous.

†*Peritoneum.*—The peritoneum was affected only in the neighbourhood of the ulcers.

†*Liver.*—No definite tubercles were seen in the liver.

†*Spleen.*—Tubercles were seen on the surface of the spleen, none in the substance.

†*Kidneys.*—There were tubercles in both kidneys.

Meninges of Brain.—Normal.

†*Bones and Joints.*—Normal.

†There were no scars in the neck.

Microscopical Examination.

Emulsion of the Mesenteric Glands.—Tubercle bacilli very numerous.

Emulsion of the Lung.—Tubercle bacilli very numerous.

Guineapigs and rabbits were inoculated with these emulsions.

CULTURES.

Cultures were isolated from a mesenteric gland direct, and from a mesenteric gland and the lung through the guineapig.

All the strains agree in their cultural characters.

On serum they produced thin uniform unpigmented greyish layers; on glycerin serum no growth was observed until towards the end of the second week when minute colonies appeared; these increased in size and coalesced where most numerous forming a grey granular layer, but did not heap up.

On agar no growth has as yet been obtained with any of the strains.

On potato a very thin grey layer was soon formed which did not subsequently increase in thickness; after incubation for a month or more in some of the tubes scattered minute pearly colonies became visible; a few of these eventually attained the size of a pin's head.

Growth on broth was very slow; at the end of two months there were two greyish-white not very thick warty islands the largest one inch in greatest diameter floating on the surface, and three lace-like islands at the bottom of the broth.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guineapigs.—Three guineapigs, Nos. 2471, 2472, and 2475, were inoculated intraperitoneally with emulsions made from the mesenteric glands; all died of general tuberculosis, two after 18 days and one after 44 days.

Two guineapigs, Nos. 2473 and 2474, were inoculated intraperitoneally with an emulsion made from the lung. One died after 5 days of an acute infection, the other after 12 days of early general tuberculosis and a subacute infection.

Rabbits.—Two rabbits, Nos. 1333 and 1334, were inoculated subcutaneously with an emulsion made from a mesenteric gland, and one, No. 1335, subcutaneously with the emulsion made from the lung.

Nos. 1333 and 1335 died after 7 and 5 days respectively of causes other than tuberculosis; No. 1334 died after 55 days of general tuberculosis.

(*b*) With culture.

Calves.—Calf 1275 was inoculated subcutaneously with 50·0 mg. of culture derived from the lung through guineapig 2474. It was killed when well 105 days later and showed general tuberculosis of moderate severity.

The disease in this calf being much less severe than that usually produced by 50·0 mg. of a virulent virus, a second calf (No. 1351) was inoculated with the same dose of culture derived from the lung. It was killed when dying of general tuberculosis 44 days later.

Rabbits.—Two series each of four rabbits were inoculated, one with culture derived from the lung through guineapig 2474, the other with culture derived from a mesenteric gland direct. In both cases intravenous, intraperitoneal, and subcutaneous inoculations were made.

Two rabbits inoculated intravenously (doses 1·0 and 0·1 mg.) died of general tuberculosis in 10 and 22 days.

Two inoculated intraperitoneally (doses 0·1 and 1·0 mg.) died of general tuberculosis in 36 and 112 days (in the latter case the injection was mainly intrastomachic).

Of four rabbits inoculated subcutaneously in doses of from 1·0 to 10·0 mg. two died in 34 and 39 days of general tuberculosis; one died after 30 days of general tuberculosis and coccidiosis of liver; and one died in 10 days, the cause of death was not ascertained, the organs and glands being healthy in appearance.

Two more rabbits were subsequently inoculated subcutaneously, at the same time as Calf 1351, each with 10·0 mg. of culture derived from the lung. One died of acute general tuberculosis in 29 days; the other of general tuberculosis in 52 days.

Guineapigs.—Two guineapigs were inoculated with the culture derived from the lung and two with that from a mesenteric gland, in doses of 1·0 or 0·1 mg. intraperitoneal and subcutaneous inoculations being made in each case. All died of general tuberculosis in periods varying from 16 to 71 days.

SUMMARY.

From the tuberculous mesenteric glands and the lung of a child aged four years, who died of tuberculosis, cultures have been isolated which are highly virulent for the rabbit and guineapig; the lung strain has been shown to be highly virulent also for the calf.

The strains obtained from the lung and from the mesenteric glands have identical cultural characters and closely resemble cultures of bovine tubercle bacilli which grow with most difficulty on artificial media.

VIRUS H. 90. "I.P."

PRIMARY ABDOMINAL TUBERCULOSIS.

Original material—The apical portions of both lungs, the mesenteric and retro-peritoneal glands.

HISTORY OF PATIENT,

The patient was a man aged 70 years who was admitted to hospital on July 30, 1907.

The only history obtainable from the man was that he had lost his appetite for six weeks.

On admission the patient was very ill, the temperature was 10·20° F., the pulse 100, the respiration 30.

The only physical signs were a few râles at left upper lobe. The heart and abdomen showed no signs at all. There was incontinence of urine.

The temperature remained between 100·0 and 104·0° F. until death; the pulse between 96 and 116; the respiration increased to 48 on the day of death. On this day râles were confined to the right upper lobe.

There were never any definite signs of consolidation of the lungs.

The patient died on August 2, 1907, three days after admission.

POST-MORTEM NOTES AND DESCRIPTION OF MATERIAL RECEIVED AT BLYTHWOOD.

†Death was found to have been due to pneumonia of both upper lobes of the lung.

†*Intestines.*—The mucous membrane of the intestines was normal. They were much matted together and bound down with old adhesions.

Mesenteric Glands.—Four were distinctly enlarged; three were composed of pinkish or greyish-pink tissue infiltrated with yellowish foci which readily broke down when scraped with a knife; the fourth was tuberculous throughout and showed more than three-quarters of its substance softened and purulent; one or two other glands showed groups of softened foci in the cortex.

Retro-peritoneal Glands.—A group of four glands, apparently slightly enlarged; one contained an irregular yellow nodule about 5 mm. in diameter, the others showed here and there a yellow focus.

Lungs.—The portions of the lungs sent were darkly pigmented, congested and emphysematous; the apical parts were collapsed and consolidated; two small deeply pigmented fibroid nodules were found in one lung, but nothing definitely tuberculous.

†The right apex was very adherent to the pleura.

†*Bronchial Glands.*—Normal but pigmented.

†*Peritoneum.*—Normal.

†*Liver.*—Pale, otherwise normal.

†*Spleen.*—Normal.

†*Kidneys.*—Normal.

†*Bones and Joints.*—Normal.

†There were no scars in the neck.

Microscopical Examination.

Emulsion of a mesenteric gland. *Emulsion of large nodule from a retro-peritoneal gland.*	Tubercle bacilli numerous; they were short, and many were beaded.

Guinea-pigs were inoculated with both emulsions; rabbits with the emulsion made from the mesenteric gland only.

CULTURES.

Cultures were sown from a mesenteric gland and a retro-peritoneal gland; all the tubes sown from the mesenteric gland became contaminated; numerous colonies of the tubercle bacillus developed on the tubes sown from the retro-peritoneal gland.

A culture of tubercle bacilli was also obtained from a guinea-pig which had been inoculated with an emulsion from a mesenteric gland.

The two strains agree in their cultural characters.

On glycerin-serum the growth was more abundant than on serum alone; the growths on particular varieties of serum had a canary-yellow colour.

On agar they produced thick creamy wrinkled layers.

Very thick coarsely-wrinkled and warty deeply-pigmented layers were produced on glycerin-potato.

The surface of broth was soon covered with a continuous membrane; this was grey, translucent and mottled with whitish woolly foci, and contained some denser opaque white occasionally warty patches.

The membrane on a bottle of gelatine was partly opaque white and moist, partly thin grey and wrinkled; on another it was grey and translucent and showed some thicker yellow patches.

INOCULATION EXPERIMENTS.

(*a*) With original material.

Guinea-pigs.—Two guinea-pigs, Nos. 2522 and 2523 were inoculated intraperitoneally with an emulsion made from a mesenteric gland, and two, Nos. 2520 and 2521, intraperitoneally with an emulsion made from a nodule in a retro-peritoneal gland. Nos. 2523 and 2521 died of general tuberculosis after 55 and 94 days respectively; No. 2522, killed after 19 days, showed early general tuberculosis; No. 2520, killed after 53 days, showed chronic general tuberculosis.

Rabbits.—Two rabbits, Nos. 1408 and 1409, were inoculated, the former subcutaneously, the latter intraperitoneally with the mesenteric gland emulsion. The subcutaneous rabbit died in nine days of pseudo-tuberculosis; the intraperitoneal animal was killed after 128 days and showed tuberculosis of the omentum and lungs only.

(*b*) With culture.

(i) *Culture derived from the mesenteric glands through guinea-pig* 2522.

Rabbits.—A series of four rabbits was inoculated with culture derived from a mesenteric gland through guinea-pig 2522, two intravenously and two subcutaneously.

One intravenous rabbit (dose 1·0 mg.) died in 15 days. The lungs were crepitant and contained fairly numerous minute transparent grey foci. The spleen was much swollen soft and dark red. No definite foci were seen in the liver or kidneys. A smear from the bone marrow showed a few tubercle bacilli.

The other (dose 0·1 mg.) was killed after 209 days. The anterior lobes of the lung showed on section caseo-purulent areas surrounded by fibrous tissue; the caudal lobes were filled with firm caseating areas, and softened caseous nodules like those in the anterior lobes. The kidneys showed a few scars on the surfaces, in some of which there were fibrous nodules, a few caseous foci in the medullae, and a flake or two of caseo-pus in the calyces. All the mammary glands were enlarged and showed caseo-purulent foci set in fibrous tissue. There was no tuberculosis elsewhere.

The two subcutaneous rabbits (doses 50·0 mg. and 15·0 mg.) were killed after 209 days; the former showed only a very large thin-walled cyst filled with caseo-pus at the seat of inoculation, the latter a bean-sized caseous nodule at the seat of inoculation, and two caseous tubercles and one grey tubercle in the lungs.

(ii) *Culture derived from the retro-peritoneal gland direct.*

Calves.—Two calves were inoculated subcutaneously with culture derived from the retro-peritoneal gland.

Calf 1383 (dose 50·0 mg.) was killed when well after 92 days, and showed general tuberculosis, progressive but not severe. The local tumour was an abscess containing caseous masses and ill-formed pus; the adjacent glands were mainly composed of dense caseous gritty substance. The lungs contained fairly numerous small fibro-caseous gritty shotty nodules, and a few larger nodules up to 1·5 cm. in diameter; on the surface there were two reddish "perlsucht" growths and a few others in an early stage of formation. The spleen contained a moderate number of fibro-caseous gritty nodules, the kidneys one each; scattered fibro-caseo-calcareous nodules were seen in the liver. The thoracic and several abdominal glands contained calcareous or caseo-calcareous tubercles, in some cases confluent; two peripheral glands contained each a caseous nodule.

Calf 1471, an older animal, received 80·0 mg.; it was killed after 90 days and showed slight progressive tuberculosis of the lungs and spleen. There was a small ulcerated tumour at the seat of inoculation; the adjacent glands contained discrete caseo-purulent nodules. The lungs contained sparsely scattered irregular reddish nodules (up to 3 mm. in diameter) showing opaque points internally; on the surface there were four reddish "perlsucht" growths (up to 8 mm in diameter), and two or three in an early stage growing from nodules in the parenchyma.

The spleen contained a dozen grey tubercles with yellow gritty centres. In the thoracic glands scattered calcareous tubercles and opaque foci were seen. Other organs and glands were normal.

Goat.—Goat 55 was inoculated subcutaneously with 50·0 mg. of culture derived from the retro-peritoneal gland.

It was killed 103 days later. There was a scar at the seat of inoculation, and the subcutaneous tissues beneath were thickened and beset with softened caseous gritty nodules. The left prescapular gland contained two large nodules similar in structure, the right one nodule and some miliary caseous tubercles. The lungs were crepitant and contained fairly numerous small grey fibrous tubercles, some slightly opaque in the centre. One kidney contained a grey nodule with a caseous centre, the other a grey streak. In the left mamma a number of millet-seed-sized tubercles with fibrous margins and caseous gritty centres were found; there were also two nodules, the largest 1 cm. in diameter, containing caseous foci; in the right mamma one small firm patch beset with caseous points was found. Most of the mesenteric glands contained soft yellow gritty tubercles, sometimes confluent forming caseo-calcareous patches. There was no tuberculosis elsewhere; a guinea-pig inoculated with an emulsion of the spleen remained healthy.

Rabbits.—Three series of rabbits were inoculated with the culture derived from the retroperitoneal gland; five in all were inoculated intravenously, in doses varying from 1·0 mg. to 0·01 mg., and four in all subcutaneously, in doses of 10·0 mg. each.

Four intravenous rabbits died of general tuberculosis in from 26 to 116 days; the fifth (dose 0·1 mg.) died in 79 days and showed tuberculosis of the lungs and kidneys insufficient to account for death, the cause of which was not apparent.

Of the rabbits inoculated subcutaneously, two were killed after 111 days, and each showed general tuberculosis.

In one there were two or three softened caseous nodules, one ulcerated, at the seat of inoculation, and the adjacent scapular gland contained a caseous nodule. The lungs were crepitant and contained irregularly distributed caseous nodules up to a small pea in size; there were flat caseous nodules on the surface of the left, loosely attached. The tendon of the diaphragm and the ventral mediastinal pleura were thickened and contained caseous patches. There was a caseous nodule on the gall bladder, and numerous small grey tubercles in the omentum. In each kidney there were a dozen projecting caseous nodules up to a hempseed in size. In the small intestine an ulcerated caseous nodule and two fibrous tubercles were seen.

The other showed a group of large nodules containing thick caseo-pus, one ulcerated, at the seat of inoculation, and a few caseous foci in the adjacent scapular gland. The lungs contained scattered caseating nodules up to a hempseed in size, and the thin margins of the anterior lobes showed caseating patches. The left kidney contained two caseating nodules and a few grey tubercles; in the right there were two nodules and pus in the calyces. Other organs and glands were normal.

The two remaining rabbits were killed after 296 days; one showed chronic progressive general tuberculosis, the other slight general tuberculosis.

Guinea-pigs.—Two guinea-pigs were inoculated with the culture derived from the retro-peritoneal gland, one intraperitoneally the other subcutaneously, in a dose of 1·0 mg. each.

They died of general tuberculosis in 29 and 85 days respectively.

SUMMARY.

A case of primary abdominal tuberculosis in a man aged 70 who died of pneumonia and showed tuberculosis limited to the mesenteric and retro-peritoneal glands.

Cultures were isolated from the mesenteric glands through the guinea-pig and from a retro-peritoneal gland direct; the strains are identical in their cultural characters, growing luxuriantly on media containing glycerin.

The strain from the mesenteric glands has low virulence for the rabbit.

The retro-peritoneal gland strain has produced fatal progressive tuberculosis in rabbits by intravenous inoculation and general progressive tuberculosis, not fatal within the period of observation by subcutaneous inoculation. It has produced in two calves generalised progressive tuberculosis, not fatal within the period of observation. (This strain was demonstrated to be a mixture of bovine and human tubercle bacilli.)

VIRUS H. 93. "C.D."

GENERAL MILIARY TUBERCULOSIS.

(Infection probably arose in the respiratory tract.)

Original material—The specimens sent were the bronchial glands, portions of the lung and meninges, and two small pieces of skin.

HISTORY OF PATIENT.

The patient was a boy aged 2 years and 3 months, who was admitted to hospital on September 11, 1907, for acne.

He had been in good health up to July 24, 1907, when he had measles and broncho-pneumonia. At the end of October dark flat spots appeared, first on the face then on the trunk and extremities, while he was recovering from pneumonia. There was some diarrhœa at the time; no melaena, the appetite was good, there was no bleeding anywhere, and no joint pains.

There was no family history of purpura. The mother was healthy and had not suffered from rheumatism; the patient was an only child. The father was well.

On admission the child showed a scattered rash on the face, chest, abdomen, back, and flexor surfaces of limbs, like a drying-up chicken pox; there was none on the scalp or buccal mucous membranes. The early lesion was a papule, red and slightly raised, disappearing on pressure, afterwards surrounded by a white scale; there was no vesicular stage, and no irritation; subsequently the lesion became darker, and did not completely disappear upon pressure. There was slight cough, occasional grunting respiration, some râles in chest. Temperature 99–102° F.; pulse 116; respiration 36–60.

Five days after admission the child was noticed to be slightly rigid and the neck was stiff; there were crepitations in the lungs. The following day lumbar puncture was performed. Tubercle bacilli were found in the fluid; the cells were chiefly lymphocytes. The child rapidly sank, and died on September 23, 1907, 12 days after admission, of tuberculous meningitis.

POST-MORTEM NOTES AND DESCRIPTION OF TISSUES RECEIVED AT BLYTHWOOD.

Lungs.—The piece of lung sent to Blythwood was firm and heavy, and was very closely beset with caseating tubercles up to 2 mm. in diameter, in places confluent; the lung tissue between the tubercles was congested and extensively consolidated.

†The whole of the organ was in a similar condition. There were no cavities.

Bronchial Glands.—One of the bronchial glands was moderately large and composed practically throughout of dense caseated tissue; two other small glands were not obviously caseous.

Meninges.—Numerous small tubercles were seen along the vessels of the pia mater.

†*Liver.*—The liver was large and fatty; no tubercles were seen.

†*Spleen.*—The spleen was enlarged, showing large numbers of tubercles.

†*Kidneys.*—The kidneys contained a few tubercles.

†*Peritoneum.*—Normal.

†*Cervical Glands.*—The cervical glands were caseous; there were no scars in the neck.

†*Intestines.*—There were about half a dozen small early tuberculous ulcers in the intestine.

†*Mesenteric Glands.*—The mesenteric glands were slightly affected.

†*Bones and Joints.*—Normal.

Skin.—The two small pieces of skin sent to Blythwood showed a few little pustules resembling acne spots.

Microscopical Examination.

Emulsion of Bronchial Gland.—Tubercle bacilli numerous.

Emulsion of Lung.—Tubercle bacilli numerous.

Emulsion of Acne Spots.—One tubercle bacillus and one small oval acid-fast bacillus seen.

Guinea-pigs were inoculated with an emulsion of the lung and with an emulsion of the acne spots; a rabbit was inoculated with the lung emulsion.

CULTURES.

Cultures were obtained from the two guinea-pigs inoculated with the lung of the child and from the guinea-pig inoculated with the skin lesions.

All the strains have been tested and have produced good growths on the differential media.

On glycerinated serum they produced thick wrinkled creamy membranes.

On glycerin-agar thick dry creamy wrinkled continuous layers were formed.

On glycerinated potato the growths were very luxuriant, heaped up, yellow, and wrinkled.

The surface of broth was in the case of each strain quickly covered with a wrinkled creamy pellicle which climbed up the sides of the bottle and became in most cases very dense and in places warty.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Rabbit.—One rabbit, No. 1509, was inoculated subcutaneously with an emulsion made from the lung; it was killed after 184 days and showed a local lesion and no tuberculosis elsewhere.

Guinea-pigs.—Two guinea-pigs, Nos. 2609 and 2610, were inoculated intraperitoneally with an emulsion made from the lung. Both died in 21 days of general tuberculosis. One guinea-pig, No. 2611, was inoculated intraperitoneally with an emulsion made from two of the pustules (acne spots); it was killed after 50 days and showed general tuberculosis, not severe.

(*b*) With cultures.

Pigs.—Two young pigs, Nos. 111 and 113, were inoculated subcutaneously with 50·0 and 100·0 milligrammes respectively of culture derived from the lung through guinea-pig 2610.

They were killed when in good health after 252 and 253 days respectively. No. 111 showed small scattered caseous nodules in and around a patch of scar tissue at the site of inoculation; an enlarged right inguinal gland wholly caseous, and a ventral mediastinal gland partly caseous; and sparsely scattered small calcified tubercles in the lungs.

No. 113 showed a puckered scar and a small patch of fibrous tissue containing caseo-calcareous tubercles; an enlarged right inguinal gland containing a caseo-calcareous mass and a ventral mediastinal gland wholly caseo-calcareous; sparsely scattered calcareous tubercles in the lungs, and one calcareous focus in a bronchial gland.

Rabbits.—Four rabbits were inoculated with culture derived from the lung through guinea-pig 2610, three intravenously with doses varying from 1·0 mg. to 0·1 mg., and one subcutaneously with 100·0 mg. Two intravenous rabbits died, one in 18 days of acute general tuberculosis, the other in 85 days and showed severe tuberculosis of the lungs, small caseous patches in the bronchial glands, and caseous tubercles and streaks in the kidneys. The third intravenous rabbit was killed after 232 days and showed chronic general tuberculosis. The rabbit inoculated subcutaneously died in 55 days and showed a large caseous ulcerated tumour, caseous tubercles in the left scapular gland, sparsely scattered small caseous tubercles in the lungs, and one tubercle in one kidney; the disease was not apparently severe enough to account for death.

Two rabbits were inoculated subcutaneously each with 50·0 mg. of culture derived from the lung through guinea-pig 2609. Both were killed 232 days later and showed one a group of small cysts at the seat of inoculation and a small caseous gritty tubercle in the lung, the other no local lesion and one firm caseating nodule the size of a hemp seed in the lung only.

Four rabbits were inoculated with culture derived from the acne spots through Guinea-pig 2611, one intravenously (1·0 mg.) and three subcutaneously (50·0 mg. each).

The former was killed after 192 days and showed in the lungs one pea-sized caseous nodule and sparsely scattered minute tubercles, and in one kidney a single tubercle.

One of the subcutaneous rabbits died in 38 days, and showed a thin walled cystic local tumour and one grey tubercle in the lung only, another was killed after 60 days and showed a nodular caseous and softened local tumour, and in the lung half a dozen small nodules with caseous centres and a few pinhead-sized grey tubercles. The third subcutaneous rabbit was killed after 192 days and showed at the seat of inoculation a large cyst filled with caseo-pus and in the lungs one hempseed-sized caseous gritty nodule and sparsely scattered small tubercles, a few with caseous centres.

Guinea-pigs.—Two guinea-pigs were inoculated each with 1·0 mg. of culture derived from the lung through guinea-pig 2610, one intraperitoneally, the other subcutaneously. They died of general tuberculosis in 18 and 39 days respectively.

SUMMARY.

From the lung and skin of a child aged 2¼ years who died of general tuberculosis, cultures were isolated which grow luxuriantly on glycerin media, and have low virulence for the rabbit. The strain derived from the lung is virulent for guinea-pigs and has produced in two pigs very slight retrogressive tuberculosis.

VIRUS H. 94. "R.M."

CALCAREOUS MESENTERIC GLAND.

(Death from Gastric Ulcer.)

Original material—The mesenteric glands.

HISTORY OF PATIENT.

The patient, a woman aged 21 years, was admitted to hospital in October, 1907, suffering from gastric ulcer. She died on October 30, 1907.

POST-MORTEM NOTES AND DESCRIPTION OF TISSUES RECEIVED AT BLYTHWOOD.

†*Intestines.*—Normal.

Mesenteric Glands.—In one of the mesenteric glands there was an irregular calcareous nodule the size of a wheat grain; the other mesenteric glands were normal in size and appearance

†*Lungs.*—Normal

†*Bronchial Glands.*—Normal.

†*Peritoneum.*—There was a small patch of old peritonitis on the right side.

†*Liver.*—Normal.

†*Spleen.*—The spleen contained no tubercles.

†*Kidneys.*—The kidneys were pale, and showed no tubercles.

†*Meninges.*—The meninges were not examined.

†*Bones and Joints.*—Normal.

†There were no scars in the neck.

Microscopical Examination.

Emulsion of Nodule from Mesenteric Gland.—No tubercle bacilli seen.

EXPERIMENTS WITH THE ORIGINAL MATERIAL.

Three guinea-pigs were inoculated intraperitoneally with an emulsion of the mesenteric gland nodule. One died in 26 days; there was no sign of tuberculosis, and the cause of death was not apparent. The other two were killed after 65 days and showed no sign of tuberculosis.

Culture tubes were sown with the emulsion; no growth resulted.

SUMMARY.

One small calcareous nodule from the mesenteric glands of a woman aged 21 years, who died of gastric ulcer, was used for investigation.

No tubercle bacilli were found in smear preparations and an emulsion made from the nodule failed to produce tuberculosis in guinea-pigs, or any growth on culture media.

VIRUS H. 95. "B.C."

CALCAREOUS MESENTERIC GLANDS.

(Death from Carcinoma of the Bladder.)

Original material—The mesenteric glands.

HISTORY OF PATIENT.

The patient, a woman aged 49, was admitted to hospital in November, 1907, suffering from carcinoma of the bladder.

She died on November 24, 1907.

POST-MORTEM NOTES AND DESCRIPTION OF TISSUES RECEIVED AT BLYTHWOOD.

†*Intestines.*—Normal.

Mesenteric Glands.—Two of the glands in the mesentery were enlarged and stony hard; one measured 0·5 cm. in diameter, the other about 1·5 cm.: the latter projected prominently from the surface of the mesentery and was very irregular on the surface; both of the glands were removed and emulsified with salt solutions; they were hard and calcareous throughout, and were with difficulty ground to a powder in the mortar.

†*Lungs.*—There was a little puckering at one apex; no cavities and no tubercles were seen in the organ.

†*Bronchial Glands.*—Normal.

†*Peritoneum.*—Normal.

†*Liver.*—Normal.

†*Spleen.*—Normal.

†*Kidneys.*—There were no tubercles in the kidneys.

†*Meninges of Brain.*—Normal.

†*Bones and Joints.*—Normal.

†There were no scars in the neck.

Microscopical Examination.

Emulsion of the two nodules from the Mesenteric Glands (three films examined).—No tubercle bacilli.

EXPERIMENTS WITH THE ORIGINAL MATERIAL.

Three guinea-pigs were inoculated intraperitoneally with the emulsion made from the mesenteric gland nodules. One died in 36 days and showed pseudotuberculosis of spleen and no sign of tuberculosis. The others were killed after 55 days and found to be healthy.

No culture tubes were sown.

SUMMARY.

Two enlarged calcareous mesenteric glands from a woman aged 49 years, who died of carcinoma of the bladder, were received for investigation.

No tubercle bacilli were found in smear preparations, and an emulsion made from the glands did not produce tuberculosis in guinea-pigs.

VIRUS H. 96. "E.H."

CALCAREOUS MESENTERIC GLANDS.

(Death from an Aortic Aneurism.)

Original material—The mesenteric glands, and a portion of the apex of the right lung.

HISTORY OF PATIENT.

The patient, a man aged 42 years, was admitted to hospital on October 25, 1907, for cough and weakness.

There was no history of consumption in the family.

The man had had winter cough (bronchitis) for several years. The present illness began five months previously; during this period the patient suffered from bad cough and increasing weakness.

The physical signs on admission to hospital were "dulness, weak breath sounds, and rales at both apices." The sputum was three times examined microscopically; no tubercle bacilli were seen.

On November 25, 1907, there was increased dyspnoea associated with almost total absence of breath sounds on the left side. Inequality of pupils and pulse and the altered character of the cough led to diagnosis of aortic aneurism.

The patient got worse and worse and died on December 5, 1907.

POST-MORTEM NOTES AND DESCRIPTION OF MATERIAL RECEIVED AT BLYTHWOOD.

†*Intestines.*—Normal.

Mesenteric Glands.—Two mesenteric glands were sent; each contained a hard calcareous nodule, one spherical and about the size of a small pea, the other very irregular and about 1 cm. in greatest diameter. The two nodules were removed after carefully searing the whole surface and emulsified in saline.

Lungs.—A very small piece of the apex of the right lung was sent to Blythwood; this was darkly pigmented dense and sank in water, but was not definitely tuberculous. The pleura was thickened. †The right lung was otherwise normal.

†The left lung was largely consolidated, and its apex was in a condition similar to that of the right.

†*Bronchial Glands.*—Enormously enlarged and pigmented.

†*Peritoneum.*—Normal.

†*Liver.*—Normal.

†*Spleen.*—Normal.

†*Kidneys.*—Normal.

†*Meninges of Brain.*—Not examined.

†*Bones and Joints.*—Normal.

†There were no scars in the neck.

Microscopical Examination.

Emulsion of Mesenteric Gland Nodules.—No tubercle bacilli.

Emulsion of Apical Portion of Right Lung.—No tubercle bacilli.

EXPERIMENTS WITH THE ORIGINAL MATERIAL.

Two guinea-pigs were inoculated intraperitoneally with the emulsion made from the mesenteric gland nodules. One died of peritonitis in eight days, the other was perfectly healthy when killed after 64 days.

One guinea-pig was inoculated intraperitoneally with the emulsion made from the lung and was also perfectly healthy when killed 64 days later.

No cultures were sown.

SUMMARY.

Two calcareous nodules from the mesenteric glands of a man aged 42 years, who died of an aortic aneurism, were used for investigation.

No tubercle bacilli were found in smear preparations, and an emulsion made from the nodules did not produce tuberculosis in guinea-pigs.

VIRUS H. 97. "E.B."

CALCAREOUS MESENTERIC GLANDS.

(Death from Syncope.)

Original material—The mesenteric glands.

HISTORY OF PATIENT.

The patient, a woman aged 90, died suddenly in the workhouse of syncope, on January 6, 1908.

Nothing was known as to her history.

POST-MORTEM NOTES AND DESCRIPTION OF TISSUES RECEIVED AT BLYTHWOOD.

†*Intestines.*—Normal.

Mesenteric Glands.—In the piece of mesentery sent there were three stony hard calcareous nodules, the largest 2 cm. in greatest diameter. One of these, after thoroughly sterilizing the surface, was removed ground to a powder and emulsified in saline.

†*Pleura.*—There were some very old pleural adhesions, and small and hard scars on the pleura covering the apices of the lungs.

†*Lungs.*—The lung parenchyma showed no signs of tuberculosis.

†*Bronchial Glands.*—Pigmented, otherwise normal.

†*Peritoneum.*—Normal.

†*Liver.*—Normal.

†*Spleen.*—Normal.

†*Kidneys.*—Normal.

†*Meninges of Brain.*—Not examined.

†*Bones and Joints.*—Normal.

†There were no scars in the neck.

Microscopical Examination.

Emulsion of Mesenteric Gland Nodule.—No tubercle bacilli.

EXPERIMENTS WITH THE ORIGINAL MATERIAL.

Three guinea-pigs were inoculated intraperitoneally with an emulsion of one of the mesenteric gland nodules. They were killed 63 days later and found to be free from tuberculosis.

No cultures were sown.

SUMMARY.

Three calcareous nodules from the mesenteric glands of a woman aged 90 years, who died of syncope, were used for investigation.

No tubercle bacilli were found in smear preparations, and an emulsion made from one of the nodules did not produce tuberculosis in guinea-pigs.

VIRUS H. 98. "B.R."

TUBERCULOUS MENINGITIS.

Original material—Cerebro-spinal fluid.

HISTORY OF PATIENT.

The patient, a female child aged 7 years, was admitted to hospital on January 7, 1908, suffering from tuberculous meningitis.

There was no history of tuberculosis in the family. The father and mother and two younger children were healthy; two other children had died of meningitis and one of pneumonia.

The child was bottle-fed. She had had measles at 14 months; "inflammation of the inside" at 2½ years, and chickenpox; otherwise the child had been healthy. Last July she had an abscess on the head. The present illness commenced with headache three weeks before admission. The child vomited twelve days ago, then became sleepy and irritable, lay curled up did not respond to questions, and had to be fed.

On admission the child was comatose, but could be roused; knee-jerks were present; there were no signs in the chest or abdomen. Lumbar puncture was performed, and 6·0 cc. of cerebro-spinal fluid was sent to Blythwood. Tubercle bacilli were present. On the following day the knee-jerks were absent. The temperature was 102·0° F.

Three days later the child was more comatose and was unable to swallow. The ophthalmo-tuberculin test gave a positive result. The next day, January 12, 1908, the child died.

POST-MORTEM NOTES.

†*Intestines.*—The intestines were not ulcerated.

†*Mesenteric Glands.*—The mesenteric glands were not enlarged; some contained minute tuberculous foci.

†*Peritoneum.*—There was a small patch of miliary tubercles on the peritoneum covering the lower part of the spleen and on the adjacent parietal peritoneum.

†*Liver.*—Normal.

†*Spleen.*—The substance was free from tubercles.

†*Kidneys.*—Normal.

†*Lungs.*—The lungs were congested, but showed no tubercles.

†*Bronchial Glands.*—The bronchial glands were enlarged and showed a few small tuberculous foci.

†*Meninges of Brain.*—There was tuberculous meningitis about the base and the Sylvian fissure; there were tubercles also round the side of the cerebellum.

There was well marked meningitis of the cord, tubercles being seen on the posterior surface.

†*Bones and Joints.*—Normal.

†There were no scars in the neck.

Microscopical Examination.

In the cerebro-spinal fluid sent to Blythwood, tubercle bacilli were moderately numerous.

Three guinea-pigs were inoculated with the fluid.

CULTURES.

A culture was isolated from one of the guinea-pigs (No. 2878) inoculated with the original material. It was tested on the differential media soon after its isolation, and produced good growths in every case.

On glycerin-serum growth was much better than on serum alone.

On glycerin-agar a cream-coloured finely wrinkled continuous layer of moderate thickness was quickly formed.

On potato the growth was moderately thick yellow and warty.

The surface of broth quickly became covered with a greyish-white finely-wrinkled membrane, which subsequently attained only a moderate thickness.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guinea-pigs.—Three guinea-pigs, Nos. 2876 (1·0 cc.), 2877 (2·0 cc.), and 2878 (2·0 cc.), were inoculated intraperitoneally with the cerebro-spinal fluid.

No. 2878 was killed after 15 days and showed early and very slight general tuberculosis; the others died in 84 and 118 days of general tuberculosis.

(*b*) With culture.

Goat.—Goat 69 was inoculated subcutaneously with 10·0 mg. of culture derived from the cerebro-spinal fluid through guinea-pig 2878. It was killed when well after 114 days. There was a small softened caseous encapsuled mass at the seat of inoculation and the adjacent prescapular gland appeared normal. The right half of the mamma was enlarged tough and fibrous and beset with shotty tubercles with caseous or calcareous centres. The left half of the mamma was about normal in size and contained similar but less numerous tubercles. There was no sign of tuberculosis elsewhere, but the supra-mammary glands were enlarged and oedematous and an emulsion from one of them produced tuberculosis in a guinea-pig.

Rabbits.—Five rabbits were inoculated with the culture derived from the cerebro-spinal fluid through guinea-pig 2878, three intravenously (doses from 0·01 to 1·0 mg.) and two subcutaneously (dose 50·0 mg. each).

One intravenous rabbit died in 59 days of psorospermosis of the liver, and showed scattered grey tubercles with caseous centres in the lungs, and three tubercles in the kidneys; another died in 68 days also of causes other than tuberculosis and showed in the lungs scattered nodules some caseous but mostly grey, and in the kidneys a few grey nodules and caseous tubercles and some pus in the calyces of one. The third (dose 0·01 mg.) was killed after 162 days and showed in the lung one minute grey tubercle and no disease elsewhere.

The subcutaneous rabbits were killed after 162 days. One showed a group of softened caseous nodules up to a pea in size at the seat of inoculation and no tuberculosis elsewhere. The other showed a large cyst filled with curdy caseo-pus at the seat of inoculation, and in the lungs scattered caseous gritty tubercles; in addition there was on the dorsal part of one caudal lobe a coarse network of irregular caseous tubercles and on the other a thin caseous gritty patch; one kidney showed a small caseous tubercle.

Guinea-pigs.—Two guinea-pigs were inoculated each with 1·0 mg. of the culture derived from the cerebro-spinal fluid, one intraperitoneally, the other subcutaneously. Both died of general tuberculosis, the former in 18 the latter in 51 days.

Kittens.—Two kittens, Nos. 55 and 59, were inoculated intraperitoneally (No. 55 was found to have been inoculated intramuscularly) each with 1·0 mg. of culture derived from the cerebro-spinal fluid, and two, Nos. 53 and 57, subcutaneously with equivalent doses.

Of the latter, No. 53 died in 8 days, and nothing could be found to account for death; No. 57 died in 12 days of pneumonia, and showed a small caseous abscess at the seat of inoculation.

Of the former, No. 59 died in 23 days and showed no macroscopic lesions and no apparent cause for death. Smears from the lung spleen and liver showed each a few tubercle bacilli; none was seen in a smear from the kidney. No. 55 was killed when in good health after 88 days and showed an irregular caseous mass in the muscle wall of the abdomen at the seat of inoculation and no tuberculosis elsewhere.

SUMMARY.

From the cerebro-spinal fluid of a child aged 7 years who died of tuberculous meningitis, a culture was isolated which grows luxuriantly on all media containing glycerin, is virulent for the guinea-pig and has low virulence for the goat, rabbit and cat.

VIRUS H. 104. "E.R."

TUBERCULOSIS OF THE LUNGS WITH CALCAREOUS MESENTERIC GLANDS.

Original material—The specimens sent were the mesenteric glands, one lung, and a number of thoracic glands.

HISTORY OF PATIENT.

The patient was a woman aged 31 years, admitted to hospital on January 28, 1908, for swollen legs. Phthisis was afterwards diagnosed in both lungs; the left apex was solid and there was a large cavity in the right apex. The patient rapidly got worse and died on February 8, eleven days after admission. The patient had been in hospital in 1906 for erysipelas and in 1907 for measles; there was no mention of phthisis in the records of these illnesses.

POST-MORTEM NOTES AND DESCRIPTION OF TISSUES RECEIVED AT BLYTHWOOD.

Lungs.—The anterior lobe and the apical portion of the posterior lobe of the lung sent to Blythwood were riddled with cavities large and small; most of the cavities were empty, but some contained a caseous sequestrum. The lung tissue between the cavities was solid and airless (pneumonic) and showed on section yellowish-white caseous patches of various sizes, some firm, others softened; the pleura showed several thickened patches. The posterior part of the posterior lobe was congested and showed here and there a caseous nodule the size of a hemp seed.

The other lung was similar.

Thoracic Glands.—There were a number of glands about the hilum of the lung sent to Blythwood; they were deeply pigmented but not otherwise abnormal.

†*Intestines.*—Normal.

Mesenteric Glands.—In the piece of mesentery sent to Blythwood there were four irregular stony hard calcareous nodules, the largest the size of a kidney bean.

†*Peritoneum.*—Normal.

†*Liver.*—Normal.

†*Spleen.*—Normal.

†*Kidneys.*—Normal.

†*Bones and Joints.*—Normal.

There were no scars in the neck.

Emulsions were made from two different parts of the lung, firm caseous substance being chosen in each case.

Two of the nodules in the mesentery were removed and emulsified.

Guinea-pigs were inoculated with the lung emulsions and with the mesenteric gland emulsion; one rabbit was inoculated with a lung emulsion, and one with the mesenteric gland emulsion.

Microscopical Examination.

Emulsion of Lung, No. 1.—Two tubercle bacilli seen. *Emulsion of Lung, No. 2.*—A few tubercle bacilli seen.	No organisms stained blue were detected.

Pus from the Interior of a Cavity.—Tubercle bacilli moderately numerous.

Emulsion of Mesenteric Gland Nodules.—Two tubercle bacilli seen and one bacillus stained blue.

CULTURES.

Cultures were obtained direct from the lung and from one of the mesenteric gland nodules; the culture in the latter case was raised from a single colony which was the only one to appear on the several tubes sown; cultures were also made from three guinea-pigs which had been inoculated with the lung and mesenteric gland emulsions.

Altogether five strains of the virus have been investigated as to their cultural characters; they have all grown well and produced practically identical results on one or other of the different media used.

The growths on serum were abundant and pigmented; slightly better growths were obtained on glycerin-serum, in one case finely wrinkled.

All the strains but one produced on glycerin-agar thick creamy wrinkled continuous layers.

The growths on potato were not very satisfactory; in two cases a creamy or yellowish wrinkled layer of medium thickness was produced, in the others the layers were thin moist and of a yellow colour.

The surface of a bottle of broth became covered with a greyish-white opaque membrane containing yellow warty patches.

The mesenteric gland strain produced on gelatine a moderately thick creamy-white slightly wrinkled warty membrane.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Rabbits.—Rabbit 1724 was inoculated subcutaneously with an emulsion made from the lung. It was killed 111 days later and showed slight tuberculosis. There was a caseous local lesion; the adjacent glands were normal. The lungs contained scattered grey nodules caseous in the centre; one kidney showed two tubercles similar in structure.

Rabbit 1725 was inoculated subcutaneously with an emulsion made from the mesenteric glands. It was killed after 111 days and also showed slight tuberculosis. There was a small cyst with thick walls and watery fluid contents at the seat of inoculation, and the adjacent glands were normal. The lungs contained a few scattered grey tubercles with caseous centres.

Guinea-pigs.—Guinea-pig 2943 was inoculated intraperitoneally with one emulsion made from the lung, and guinea-pigs 2944 and 2945 with the other, also intraperitoneally.

No. 2943 died in 20 days and showed slight tuberculosis; Nos. 2944 and 2945 died of general tuberculosis in 35 and 28 days respectively.

Guinea-pigs 2941 and 2942 were inoculated intraperitoneally with the emulsion made from the mesenteric glands. They were killed after 42 days and each showed early general tuberculosis.

(*b*) With culture.

Calves.—Calf 1385 was inoculated intravenously with 5·0 mg., and Calf 1393 subcutaneously with 50·0 mg., of culture derived from the human lung.

Calf 1385 died in 29 days. Nearly the whole of the left lung and of the anterior lobes of the right lung was dark red and airless; in the posterior lobe of the right lung the dark red areas were somewhat less extensive. The whole lung was closely packed with very minute greyish white tubercles. The right middle lobe was mottled with yellow necrotic areas and several lobules in the left caudal lobe were firm and necrotic. The thoracic glands were enlarged and in an early state of caseation. In the right side of the heart fairly numerous minute tubercles were seen. A moderate number of minute whitish foci were seen in the liver and right kidney. Tubercle bacilli were moderately numerous in smears from the lung and liver, scanty in smears from spleen and suprarenal body; none was seen in a smear from a gluteal gland.

Calf 1393 was killed after 117 days. There was a large cyst at the seat of inoculation filled with caseo-pus and firm caseous masses. The left prescapular gland was three-quarters caseous and calcareous; one prepectoral gland was caseous throughout. In the lungs a few small grey tubercles were seen. Most of the peripheral lymphatic glands contained scattered caseous gritty tubercles; the mesenteric glands contained some scattered calcareous foci.

Rhesus Monkeys.—Two monkeys were inoculated subcutaneously with culture derived from the human lung; one, No. 159, received 1·0 mg., the other, No. 161, received 0·01 mg.

Monkey 159 died in 12 days, and showed a soft caseous lesion at the seat of inoculation only. The cause of death was not determined.

Monkey 161 died in 32 days, and showed general tuberculosis, the duration of life being less than is usual for the dose in viruses of this character. There was an ulcerated purulent local lesion, and several axillary, inguinal, and cervical glands contained caseous nodules. Three vertebral glands were caseous and softened throughout. The lungs were crepitant and contained sparsely scattered grey tubercles with caseous centres. There was a caseous tubercle in the heart, and caseous tubercles in the bronchial glands. The spleen appeared to be slightly enlarged, and contained moderately numerous caseous tubercles; the liver was moderately closely beset with similar tubercles; there were one or two in each kidney. The glands in the throat and several abdominal glands contained caseous tubercles or nodules.

Rabbits.—Four rabbits were inoculated with culture derived from the lung, three intravenously in doses of 0·01 mg. up to 1·0 mg., and one subcutaneously, dose 27·0 mg. Another rabbit was subsequently inoculated intravenously, dose 0·01 mg.

One intravenous rabbit died in 16 days and showed early tuberculosis of the lungs and severe psorospermosis of the liver; another died in 18 days and showed early general tuberculosis and severe pseudotuberculosis of the spleen; a third died in 33 days of cellulitis, and showed miliary tuberculosis of the lungs and kidneys; the fourth (dose 0·01 mg.) was killed after 152 days and showed very slight tuberculosis of lungs and kidneys. The subcutaneous rabbit was killed after 168 days, and showed a very large cyst with caseo-purulent contents, a few soft caseous nodules and grey tubercles in the lungs, and two caseous tubercles in one kidney; two mammary glands were caseous.

Four rabbits were inoculated with culture derived from the mesenteric gland, three intravenously (doses 1·0 to 0·01 mg.), and one subcutaneously (dose 50·0 mg.).

One intravenous rabbit (dose 1·0 mg.) died in 24 days; the lungs were red and hepatised and closely beset with minute grey tubercles, the bronchial gland was enlarged oedematous and contained small caseous patches. The kidneys were speckled with minute grey tubercles, and the spleen was swollen.

Another (dose 0·1 mg.) died in 131 days of cellulitis of the back. There were scattered transparent grey tubercles in the lungs, and one flat fibro-caseo-calcareous patch. The bronchial glands contained a few calcareous patches. There were cicatrices on the surface of each kidney, and caseous gritty streaks in the medulla.

The third (dose 0·01 mg.) was killed after 143 days and showed two caseous nodules and a few minute tubercles in the lungs and in the kidneys three greyish nodules with slight central caseation.

The subcutaneous rabbit was killed after 143 days and showed a caseous and softened local lesion and slight tuberculosis of the lungs, and no tuberculosis elsewhere.

Guinea-pigs.—Two guinea-pigs were inoculated subcutaneously with culture derived from the lung (doses 1·0 mg. and 0·1 mg.). One died prematurely in 7 days and showed a small local lesion and slight enlargement and early caseation of the nearest glands. The other died in 28 days and showed early general tuberculosis insufficient to account for death.

Two guinea-pigs were subsequently inoculated intraperitoneally each with 0·01 mg. of the culture. They died in 20 and 43 days; one showed early slight general tuberculosis, the other severe general tuberculosis.

SUMMARY.

From the tuberculous lung of a woman aged 31 years who died of phthisis a culture was isolated which grows luxuriantly on glycerin media, is virulent for the monkey and the guinea-pig, and has low virulence for the calf and rabbit.

A culture obtained from one of the calcareous nodules in the mesenteric glands was identical with the culture from the lung on artificial media and in its virulence for rabbits.

VIRUS H. 115. "N.G."

TUBERCULOUS MENINGITIS.

Original material—Cerebro-spinal fluid.

HISTORY OF CASE.

The patient was a female child aged 3 years admitted to hospital on May 20, 1908, suffering from meningitis.

Past history.—The child had chickenpox eighteen months previously, and measles four months ago; she made a good recovery from the latter illness. She was subject to coughs during the winter and was said to bring up phlegm.

Family history.—The father died of consumption a month previous to the child's admission to hospital; he had been ill four months. The mother had a "winter cough." The child's maternal grandmother died of consumption, also her maternal uncle (one year ago). There was no further history of tuberculosis on the father's side of the family. The child was the younger of two children; the elder (aged 5½ years) was said to have a "weak chest."

History of the illness.—The patient suffered from severe vomiting for 14 days with constipation and fretfulness; drowsiness and stiffness of the neck was noticed during the last few days of this period and she was evidently getting worse.

On admission to hospital the patient was well-nourished, irritable, had a slight squint, and some photophobia. There were no physical signs in the chest or abdomen. The temperature was 102·0° F., the pulse 120, the respiration 28.

Lumbar puncture was performed; examination of the fluid showed lymphocytes 90 per cent, polymorpho nuclear cells 10 per cent; no tubercle bacilli were seen.

The patient gradually became more and more comatose. Lumbar puncture was performed several times; two doubtful tubercle were seen in the fluid on one occasion.

On June 1, 1908, twelve days after admission to hospital, the child died. No post-mortem examination was made.

Cerebro-spinal fluid removed on May 28, 1908, was sent to Blythwood. No tubercle bacilli were seen in a smear made from the fluid.

Two guinea-pigs were inoculated with it.

CULTURES.

Cultures were obtained from the two guinea-pigs (Nos. 3086 and 3087) inoculated with the original material. The two strains were tested on the differential media and found to be identical.

On serum and glycerin-serum they formed pigmented layers, much better on the serum containing glycerin than on the serum alone.

On agar and potato the growths were luxuriant cream-coloured and highly wrinkled.

On broth one strain produced a thick creamy membrane, wrinkled and in places warty, which completely covered the surface. The other strain covered the surface of the broth in three weeks with a greyish-white not very thick granular membrane, the surface of which was studded with pinhead-sized colonies.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guinea-pigs.—Two guinea-pigs, Nos. 3086 and 3087, were inoculated intraperitoneally each with about 2·5 cc. of the cerebro-spinal fluid.

They were killed after 40 days; No. 3086 showed early general tuberculosis, and No. 3087 tuberculosis of the omentum and pyloric gland.

(*b*) With culture.

Goat.—Goat 81 was inoculated intravenously with 2·0 mg. of culture derived from the original material through Guinea-pig 3087. It died in 41 days of tuberculosis of the lungs and thoracic glands; there were no tuberculous lesions elsewhere in the body.

Rabbits.—Four rabbits were inoculated, two intravenously and two subcutaneously, with culture derived from the original material through Guinea-pig 3087.

One intravenous rabbit (dose 0·1 mg.) died of injuries in 23 days; a few minute grey foci were seen in the lungs. The other (dose also 0·1 mg.) was killed after 145 days. Almost the whole of the anterior lobes of the lungs and part of the caudal lobes were consolidated and composed of pinkish fibroid tissue, riddled with small cavities containing gritty caseo-pus, or beset with calcareous grains; the rest of the caudal lobes contained separate masses composed of caseo-pus in a fibrous network. One kidney showed a few caseous nodules in the medulla and pus in the calyces, the other depressed scars on the surfaces and three or four tubercles and caseous streaks on section. The mammary glands were enlarged and the alveoli filled with caseo-pus. There was no tuberculosis elsewhere.

The two subcutaneous rabbits were killed after 145 days; in one (dose 32·0 mg.) there was a cyst filled with caseo-pus at the seat of inoculation, in the anterior lobes of the lungs there were some softened caseous areas with fibrous walls, and elsewhere in the lungs eight or nine scattered tubercles; the other (dose 10·0 mg.) showed a small cyst at the seat of inoculation, two or three caseo-calcareous foci in one scapular gland, and scattered fibro-caseous—some gritty—nodules up to a small pea in size in the lungs.

Guinea-pigs.—Three guinea-pigs were inoculated with culture derived from the original material through Guinea-pig 3087, two intraperitoneally (doses 1·0 and 0·1 mg.) and one subcutaneously (dose 0·1 mg.). They all died of general tuberculosis, the former in 33 and 27 days respectively, the latter in 94 days.

SUMMARY.

From the cerebro-spinal fluid of a child aged three years, who died of tuberculous meningitis, a culture was isolated which grows luxuriantly on all media containing glycerin, is virulent for guinea-pigs and slightly virulent for rabbits.

VIRUS H. 116. "B.F."

CALCIFIED MESENTERIC GLAND.

(Death from Malignant Endocarditis.)

Original material—A calcified mesenteric gland.

HISTORY OF PATIENT.

The patient was a young man, aged 20, who died of malignant endocarditis and aneurism of the mitral valves, on June 28, 1908.

POST-MORTEM NOTES AND DESCRIPTION OF MATERIAL RECEIVED AT BLYTHWOOD.

†*Lungs.*—There were some old adhesions at the right apex of the lung, but no sign of tuberculosis.

†*Bronchial Glands.*—The bronchial glands were enlarged; there was no tuberculosis.

†*Liver.*—The liver was enlarged and granular. No tubercles seen.

†*Spleen.*—The spleen was large and pale. No tubercles seen.

†*Kidneys.*—The kidneys were enlarged. No tubercles seen.

†*Peritoneum.*—Normal.

†*Intestines.*—Not examined.

Mesenteric Glands.—In the mesentery there was one hard completely calcified gland 1 cm. in greatest diameter; the other glands appeared enlarged, but were not otherwise abnormal.

†*Bones and Joints.*—Normal.

†*Meninges of Brain.*—Normal.

†There were no scars in the neck.

An emulsion was made of the calcified mesenteric gland; no tubercle bacilli were seen in a smear made from the emulsion.

Animals inoculated.—Two guinea-pigs, Nos. 3141–3142, were inoculated intraperitoneally with the emulsion.

They were killed after 82 days and found to be free from tuberculosis.

SUMMARY.

A calcified mesenteric gland from a young man aged 20 years, who died of malignant endocarditis, was received for investigation.

No tubercle bacilli were seen in a smear preparation and an emulsion made from the gland did not produce tuberculosis in guinea-pigs.

VIRUS H. 118. "F.C."

TUBERCULOSIS OF THE LUNG.

Original material—Sputum.

HISTORY OF PATIENT.

The patient was a woman aged 50 years, married, but childless.

There was no family history of tuberculosis, but a brother-in-law had died of phthisis in 1906 in the same house.

The patient dates her illness from July, 1906, when she suffered from dyspepsia and cough. She continued to suffer from dyspepsia and cough until October, 1908, and lost flesh. The sputum was examined microscopically twice during this period, but no tubercle bacilli were found.

In the middle of October she had acute pain on the left side and examination revealed signs of consolidation of both apices. The sputum was examined and numerous tubercle bacilli were found.

She was examined again in November and active tuberculosis in the left lung was diagnosed; in the right lung the tuberculosis was said to be quiescent.

Since November she has gradually improved in health and put on flesh; the cough has ceased, but she still has pain on the left side.

Sputum was collected for examination on October 31, 1908.

Use made of Sputum.

The sputum was inoculated into guinea-pigs and examined microscopically; in the smear preparation tubercle bacilli were numerous.

CULTURES.

A culture was obtained from the sternal gland of Guinea-pig 3343 which had been inoculated with the sputum.

Growths on serum were pigmented; on glycerin-serum a creamy wrinkled layer was produced; on glycerin agar a thick continuous creamy wrinkled membrane was formed. Cultures on potato failed.

The surface of a bottle of broth was quickly covered with a thick creamy-white leathery membrane, wrinkled and coarsely warty near the serum, and showing here and there thinner grey patches.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guinea-pigs.—Two guinea-pigs, Nos. 3343 and 3344, were inoculated intraperitoneally with the sputum; they died of general tuberculosis in 20 and 27 days respectively.

(*b*) With culture.

Goat.—Goat 77 was inoculated subcutaneously with 25·0 mg. of culture derived from the original material through Guinea-pig 3343; it showed when killed 116 days later local tuberculosis, sparsely scattered caseous gritty tubercles in the lungs, and no tuberculosis elsewhere.

Rhesus Monkey.—Monkey 263 was inoculated subcutaneously with 1·0 mg. of the culture derived from Guinea-pig 3343; it died of general tuberculosis in 36 days.

Rabbits.—A series of four rabbits was inoculated with the culture derived from Guinea-pig 3343, two intravenously (doses 0·1 and 0·01 mg.) and two subcutaneously (doses 10·0 mg. each). Two died of causes other than tuberculosis in 109 and 126 days, the other two were killed after 152 days; all showed slight generalised retrogressive tuberculosis.

Guinea-pigs.—Two guinea-pigs were inoculated, one intraperitoneally (0·1 mg.) and one subcutaneously (0·1 mg), with the culture derived from Guinea-pig 3343; they died of general tuberculosis in 14 and 58 days respectively.

Fowls.—Two fowls were inoculated intravenously with the culture derived from Guinea-pig 3343. One (dose: 10·0 mg.) died in three days, from injuries inflicted by its companions; the other (dose: 50·0 mg.) died of acute tuberculosis (toxaemia) in 32 days.

SUMMARY.

From the sputum of a woman aged 50 years, suffering from pulmonary tuberculosis, a culture was obtained which grows luxuriantly on artificial media, is virulent for the rhesus monkey and guinea-pig and slightly virulent for the rabbit.

VIRUS H. 119. "E.S."

TUBERCULOSIS OF THE LUNG.

Original material—Sputum.

HISTORY OF PATIENT.

The patient was a man aged 22 years, admitted to hospital on December 4, 1908.

He had three brothers and three sisters who were said to be "weak chested."

The patient himself had enjoyed good health up to two years before admission when he had a slight haemorrhage. Fourteen months later he was compelled to give up work on account of shortness of breath and a bad cough.

In hospital he presented signs of infiltration of the upper and lower lobes of the right lung and of the upper lobe of the left lung. The temperature was irregular but not pyrexial, and he lost weight.

Sputum was collected for experiment on February 4, 1909.

Use made of Sputum.

The sputum was inoculated into guinea-pigs and rabbits and examined microscopically. Moderately numerous tubercle bacilli were found in the smear preparation.

CULTURES.

A culture was obtained from the portal gland of Guinea-pig 3439 which had been inoculated with the sputum.

On serum the growths were pigmented and moderately thick; on glycerin serum growth was much better than on serum alone and was mostly creamy, warty or wrinkled. On glycerin agar a thick continuous highly wrinkled creamy layer was formed.

Growths on broth were not satisfactory; in only one case was the surface completely covered, the membrane formed being partly opaque yellowish and not very thick and partly thin and grey.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guinea-pigs.—Two guinea-pigs, Nos. 3438 and 3439, were inoculated intraperitoneally with the sputum, the former receiving 1·0 cc., the latter 1·5 cc. They died of acute general tuberculosis in 17 and 16 days respectively.

Rabbits.—Two rabbits were inoculated intravenously, one with 1·5 cc. the other with 2·0 cc. of the sputum; they were killed by the injection.

(*b*) With culture.

Rabbits.—A series of four rabbits was inoculated with the culture derived from the original material through Guinea-pig 3439, two intravenously and two subcutaneously.

One intravenous animal (dose 0·1 mg.) died in 65 days of tuberculosis of the lungs and kidneys, the other (dose 0·01 mg.) was killed after 95 days and showed slight generalised retrogressive tuberculosis. The two subcutaneous rabbits were killed after 95 days; one (dose 23·0 mg.) showed slight generalised tuberculosis, the other (dose 10·0 mg.) a local lesion and slight retrogressive tuberculosis of the lungs.

Guinea-pigs.—Two guinea-pigs were inoculated each with 0·1 mg. of the culture derived from Guinea-pig 3439, one intraperitoneally, the other subcutaneously. The former died in 11 days and showed early general tuberculosis insufficient to account for death, the latter died in 55 days of general tuberculosis.

SUMMARY.

From the sputum of a man aged 22, suffering from pulmonary tuberculosis, a culture was obtained which grows luxuriantly on artificial media, is virulent for the guinea-pig and slightly virulent for the rabbit.

VIRUS H. 120. "B.W."

TUBERCULOSIS OF THE LUNG.

Original material—Sputum.

HISTORY OF PATIENT.

The patient was a man aged 21 years, admitted to hospital on January 1, 1909.

There was no family history.

The patient had been in good health until midsummer, 1907, when he caught cold and began to have night-sweats. He had had a bad cough for some months previous to admission to hospital.

On admission he presented signs of infiltration at the apex of the upper lobe and the upper part of the lower lobe of the right lung and at the apex of the upper lobe of the left lung; the temperature was somewhat irregular during the first month in hospital, varying between 97° F. and 100° F., but subsequently became regular and normal.

Sputum was collected for experiment on February 4, 1909.

Use made of Sputum.

The sputum was inoculated into guinea-pigs and rabbits and examined microscopically; in the smear preparation numerous uniformly-stained tubercle bacilli mostly straight and short were found.

CULTURES.

A culture was obtained from one of the sternal glands of Guinea-pig 3442 which had been inoculated with the sputum.

Good growths with a yellow pigment were obtained on serum. On glycerin serum the growths were luxuriant creamy and wrinkled, and thrown into folds in the lower part of the tube. On glycerin agar the 5th generation yielded only a patchy grey layer finely wrinkled, and on potato only a thin greyish-yellow granular layer was formed. The 11th generation however produced on each of these media a thick creamy-yellow wrinkled layer, a thick pellicle being formed on the condensation water of the agar tube.

The surface of a bottle of broth became covered with a thick creamy wrinkled membrane showing many warty yellow patches.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guinea-pigs.—Two guinea-pigs, Nos. 3442 and 3443, were inoculated intraperitoneally, the former with 1·0 cc., the latter with 1·5 cc. of the sputum; they were killed after 17 days and each showed early general tuberculosis.

Rabbits.—Two rabbits, Nos. 2147 and 2148, were inoculated intravenously, the former with 1·5 cc., the latter with 0·5 cc. of the sputum.

No. 2147 was killed by the injection. No. 2148 died in 86 days of tuberculosis; the lungs were enlarged and heavy and showed the surface composed mainly of caseous substance which penetrated pretty deeply, and the central parts of the lung showed discrete caseous nodules surrounded by a margin of congested lung tissue; there were one or two small tubercles in the bronchial glands and kidneys and no tuberculosis elsewhere.

(*b*) With culture.

Rabbits.—A series of four rabbits was inoculated with the culture derived from the sputum through Guinea-pig 3442, two intravenously and two subcutaneously.

One intravenous rabbit (dose 0·1 mg.) died in 86 days of general tuberculosis, moderately severe in the lungs, the other (dose 0·01 mg.) was killed after 98 days and showed slight tuberculosis of the lungs and kidneys; the two subcutaneous rabbits (doses 10·0 mg. each) were also killed after 98 days and showed slight generalised tuberculosis.

Guinea-pigs.—Two guinea-pigs were inoculated, each with 0·1 mg. of the culture derived from Guinea-pig 3442, one intraperitoneally, the other subcutaneously; they died of general tuberculosis in 29 and 77 days respectively.

SUMMARY.

From the sputum of a man aged 21, suffering from pulmonary tuberculosis, a culture was isolated which grows luxuriantly on artificial media, is virulent for the guinea-pig and slightly virulent for the rabbit.

VIRUS H. 121. "E.A."

TUBERCULOSIS OF THE LUNG.

Original material—Sputum.

HISTORY OF PATIENT.

The patient was a man aged 23 years, admitted to hospital on January 22, 1909.

There was no family history.

The patient's present illness started with cough two years ago; up to that time he had been in good health.

On admission to hospital he was suffering from fistula, and he presented signs of infiltration of the right upper lobe of the lung; his temperature is normal.

Sputum was collected for experiment on February 4, 1909.

Use made of Sputum.

The sputum was inoculated into guinea-pigs and rabbits, and examined microscopically; in the smear preparation numerous tubercle bacilli were seen, many long and beaded.

CULTURES.

A culture was obtained from the sternal gland of Guinea-pig 3445 which had been inoculated with the sputum.

It produced pigmented growths on serum and luxuriant creamy growths on glycerin serum.

On glycerin agar a very luxuriant highly-wrinkled creamy continuous membrane was produced.

On potato the growth was of moderate thickness only, greyish-white and granular with a yellow warty patch at foot of slope. A later generation produced a thick raised creamy-yellow wrinkled layer.

The surface of a bottle of broth became covered with a translucent grey wrinkled membrane, showing many yellow warty patches and nodules.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guinea-pigs.—Two guinea-pigs, Nos. 3444 and 3445, were inoculated intraperitoneally, the former with 1·5 cc, the latter with slightly less than 1·0 cc. of the sputum. No. 3444 died in three days of septic peritonitis; No. 3445 was killed after 17 days and showed early general tuberculosis.

Rabbits.—Two rabbits, Nos 2149 and 2150, were inoculated intravenously each with 0·5 cc. of the sputum. They were each killed after 144 days and showed, one tuberculosis of the lungs kidneys and eyes, the other slight tuberculosis of the lungs and a kidney and severe tuberculosis of one testicle.

(*b*) With culture.

Rabbits.—A series of four rabbits was inoculated with the culture derived from the original material through Guinea-pig 3445, two intravenously and two subcutaneously.

One intravenous rabbit (dose 0·1 mg.) was killed after 94 days and showed generalised tuberculosis moderately severe in the lungs; the other intravenous (0·01 mg.) and the two subcutaneous animals (26·0 mg. and 10·0 mg.) were killed also after 94 days and each showed slight retrogressive tuberculosis.

Guinea-pigs.—Two guinea-pigs were inoculated each with 0·1 mg. of the culture derived from Guinea-pig 3445, one intraperitoneally the other subcutaneously. They died of general tuberculosis in 24 and 57 days respectively.

SUMMARY.

From the sputum of a man aged 23, suffering from pulmonary tuberculosis, a culture was obtained which grows luxuriantly on artificial media, is virulent for the guinea-pig and slightly virulent for the rabbit.

VIRUS H. 122. "F.P."

TUBERCULOSIS OF THE LUNG.

Original material—Sputum.

HISTORY OF PATIENT.

The patient was a man aged 28 years, admitted to hospital on November 13, 1908.

There was no family history.

Seven years ago the patient had pneumonia of the right side with some haemoptysis; he has had a cough ever since. Eight months before admission he had another attack of haemoptysis.

In hospital the patient presented signs of a cavity at the right apex and consolidation of the rest of the upper lobe of the right lung. The left lung was normal. The temperature was normal.

Sputum was collected for experiment on February 4, 1909.

Use made of Sputum.

The sputum was inoculated into guinea-pigs and rabbits and examined microscopically; in the smear preparation moderately numerous long beaded tubercle bacilli were seen.

CULTURES.

A culture was obtained from the sternal gland of Guinea-pig 3446 which had been inoculated with the sputum.

On serum the growths were slightly pigmented; on glycerin serum growth was much better than on serum alone, showing raised creamy-white warty patches and ridges.

On glycerin-agar (5th generation) a thin patchy grey layer with a few fine wrinkles was produced. Growth on glycerin potato was moderately thick creamy-yellow and warty; a later generation produced a thick yellow wrinkled layer.

The surface of a bottle of broth became covered with a greyish-white leathery membrane with a smooth surface thrown into folds; here and there was a patch or two of thin grey membrane.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guinea-pigs.—Two guinea-pigs, Nos. 3446 and 3447, were inoculated intraperitoneally, the former with 2·0 cc. the latter with 1·5 cc. of the sputum. The former was killed after 17 days, the latter died in 20 days; both showed early general tuberculosis.

Rabbits.—Two rabbits, Nos. 2151 and 2152, were inoculated with the sputum, the former intravenously (0·5 cc.), the latter intraperitoneally (1·0 cc.). No. 2151 was killed by the injection. No. 2152 was killed after 144 days and showed tuberculosis of lungs and slight tuberculosis of the peritoneum and kidneys.

(*b*) With culture.

Rabbits.—A series of four rabbits was inoculated with the culture derived from the original material through Guinea-pig 3446, two intravenously and two subcutaneously. The subcutaneous rabbits died prematurely in 6 and 12 days; the intravenous rabbits (doses 0·1 mg. and 0·01 mg.) were killed after 99 days and each showed generalised tuberculosis, slight in one moderately severe in the other.

Subsequently two more rabbits were subcutaneously inoculated with the culture, each receiving 10·0 mg.; they were killed after 106 days and showed slight generalised retrogressive tuberculosis.

Guinea-pigs.—Two guinea-pigs were inoculated each with 0·1 mg. of the culture derived from Guinea-pig 3446, one intraperitoneally, the other subcutaneously. They died of general tuberculosis in 20 and 33 days respectively.

SUMMARY.

From the sputum of a man aged 28 suffering from pulmonary tuberculosis a culture was obtained which grows luxuriantly on artificial media, is virulent for guinea-pigs and slightly virulent for rabbits.

VIRUS H. 123. "W.W."

TUBERCULOSIS OF THE LUNG.

Original material—Sputum.

HISTORY OF PATIENT.

The patient was a youth aged 17 years admitted to hospital on January 18, 1909.

There was no family history.

The present illness commenced in September, 1908, with a bad cough, and the patient has had night-sweats and much expectoration.

In hospital the patient presented signs of cavitation at the apices of the upper and lower lobes of the right lung, infiltration of the upper lobe of the right lung below the cavity, and infiltration of the upper lobe of the left lung.

The temperature showed marked irregularity, with fever; it generally varied between 100° F. and 102° F., and seldom fell below 99° F.

The patient lost weight in hospital and became worse.

Sputum was collected for experiment on February 4, 1909.

Use made of Sputum.

The sputum was inoculated into guinea-pigs and rabbits, and examined microscopically; in the smear preparation very numerous tubercle bacilli were seen, both short and long, uniformly stained.

CULTURES.

A culture was obtained from a sternal gland of Guinea-pig 3450 which had been inoculated with the sputum.

The culture grew well on serum, and the growths were pigmented.

On agar a moderately but not uniformly thick creamy wrinkled layer was formed; the summits of the wrinkles were yellow.

On potato a very thick, heaped up, coarsely-wrinkled yellowish layer was produced.

The surface of a bottle of broth became covered with a moderately thick creamy warty membrane.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guinea-pigs.—Two guinea-pigs, Nos. 3450 and 3451, were inoculated intraperitoneally each with 1·0 cc. of the sputum. They died of general tuberculosis in 20 and 31 days respectively.

Rabbits.—Two rabbits, Nos. 2153 and 2154, were inoculated intraperitoneally, the former with 2·0 cc. the latter with 1·0 cc. of the sputum. No. 2154 died in 27 days and showed tuberculosis of the omentum and no sign of disease elsewhere, and No. 2153 was killed after 145 days, and showed slight tuberculosis of the omentum and lungs.

(*b*) With culture.

Rabbits.—A series of four rabbits was inoculated with the culture derived from the original material through Guinea-pig 3450, two intravenously (doses 0·1 and 0·01 mg.), and two subcutaneously (doses 21·0 and 10·0 mg.).

One intravenous animal (0·1 mg.) died in 14 days of early general tuberculosis; the remaining three rabbits were killed after 101 days, and each showed slight retrogressive tuberculosis.

Guinea-pigs.—Two guinea-pigs were inoculated with the culture derived from Guinea-pig 3450, one intraperitoneally (0·1 mg.) and one subcutaneously (0·1 mg.). They died of general tuberculosis in 22 and 68 days respectively.

SUMMARY.

From the sputum of a youth aged 17 suffering from pulmonary tuberculosis a culture was obtained which grows luxuriantly on artificial media, is virulent for the guinea-pig, and slightly virulent for the rabbit.

VIRUS H. 124. "M.M."

TUBERCULOSIS OF THE LUNG.

Original material—Sputum.

HISTORY OF PATIENT.

The patient was a youth aged 17 years, admitted to hospital on September 19, 1908.

There was no family history.

The patient had never been very strong, but there was no definite history of the commencement of his illness. On admission the patient presented signs of consolidation of the upper lobe of the left lung, without cavitation. The temperature was high on admission and became normal in December. The patient has been treated with tuberculin.

Sputum was collected for experiment on February 4, 1909.

Use made of Sputum.

The sputum was inoculated into guinea-pigs and rabbits and examined microscopically. In the smear preparation tubercle bacilli were moderately numerous.

CULTURES.

A culture was obtained from one of the sternal glands of Guinea-pig 3452 which had been inoculated with the sputum.

Slightly pigmented growths were obtained on serum; growths on glycerin-serum were very thick creamy-yellow and highly wrinkled.

On agar a thick uniform creamy-yellow wrinkled membrane was formed. On potato a very thick brownish-yellow coarsely-wrinkled layer was produced.

The surface of a bottle of broth became covered with a membrane which was in parts thick leathery and warty, in parts opaque and creamy-white, and in parts thin and grey.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guinea-pigs.—Two guinea-pigs, Nos. 3452 and 3453, were inoculated intraperitoneally with the sputum No. 3452 (dose 1·0 cc.) was killed after 21 days and showed early general tuberculosis, and No. 3453 (dose 1·5 cc.) died in 24 days of general tuberculosis.

Rabbits.—Two rabbits, Nos. 2155 and 2156, were inoculated intraperitoneally with the sputum. No. 2155 (dose 1·5 cc.) died in four days of septic peritonitis; No. 2156 (dose 1·0 cc.) was killed after 145 days and showed slight generalised tuberculosis.

(*b*) With culture.

Calf. — Calf 1603 was inoculated subcutaneously with 200·0 mg. of culture derived from the original material through Guinea-pig 3452.

It was killed after 93 days and showed very slight retrogressive generalised tuberculosis.

Rabbits.—A series of four rabbits was inoculated, two intravenously and two subcutaneously with the culture derived from the original material through Guinea-pig 3452.

All the rabbits were killed after 100 days; one intravenous animal (dose 0·1 mg.) showed general tuberculosis moderately severe in the lungs and spleen, the other (dose 0·01 mg.) showed general tuberculosis, not severe in any of the organs. Of the two rabbits subcutaneously inoculated, one (dose 39·0 mg.) showed local tuberculosis, tuberculosis of the lungs and one tubercle in each kidney, the other (dose 10·0 mg.) general tuberculosis obviously progressive on the pleura and in the lungs.

Subsequently two more rabbits were inoculated subcutaneously with the culture derived from Guinea-pig 3452, each receiving 10·0 mg.

They were killed after 142 days and each showed a local lesion, slight tuberculosis of lungs and one tubercle in a kidney.

Guinea-pigs.—Two guinea-pigs were inoculated with the culture derived from Guinea-pig 3452, one intraperitoneally (0·1 mg.) and one subcutaneously (0·1 mg.). They died of general tuberculosis in 25 and 44 days respectively.

SUMMARY.

From the sputum of a youth aged 17 suffering from pulmonary tuberculosis a culture was obtained which grows luxuriantly on artificial media, is slightly virulent for the calf and virulent for the guinea-pig. It produced in four out of five rabbits (two intravenous, three subcutaneous) tuberculosis of a type frequently met with after the inoculation of the human tubercle bacillus; the fifth rabbit, inoculated subcutaneously, showed an unusually severe type of tuberculosis. Cultures recovered from this rabbit produced fatal tuberculosis in two rabbits intravenously inoculated; cultures from these rabbits grew luxuriantly like the original culture and produced in nine rabbits inoculated subcutaneously slight generalised tuberculosis.

VIRUS H. 125. "A.P."

TUBERCULOSIS OF THE LUNG.

Original material—Sputum.

HISTORY OF PATIENT.

The patient was a man aged 25 years, admitted to hospital on January 1, 1909.

There was no family history.

The patient had been suffering from cough weakness and shortness of breath for twelve months before admission.

In hospital the patient presented signs of consolidation of the upper lobes of both lungs, but no cavities. He had an attack of pleurisy after admission. The temperature was normal on admission, it rose during the attack of pleurisy and was afterwards normal.

Sputum was collected for experiment on February 4, 1909.

Use made of Sputum.

The sputum was inoculated into guinea-pigs and rabbits and examined microscopically; the smear preparation showed moderately numerous long beaded tubercle bacilli.

CULTURES.

A culture was obtained from one of the sternal glands of Guinea-pig 3454 which had been inoculated with the sputum.

Good pigmented growths were obtained on serum.

On glycerin serum growth was thicker than on serum greyish-white with raised whitish ridges and patches.

On agar the 5th generation produced no growth, the 7th a greyish-yellow finely-wrinkled layer, the 11th a thick creamy highly-wrinkled continuous layer.

On potato a luxuriant yellow wrinkled and warty layer was formed.

The pellicle produced on broth covered the surface and was partly milky white and not very thick, partly thin and grey.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guinea-pigs.—Two guinea-pigs, Nos. 3454 and 3455, were inoculated intraperitoneally with the sputum. No. 3454 (dose 1·5 cc.) was killed after 21 days and showed early general tuberculosis; No. 3455 (dose 1·0 cc.) died in 50 days of general tuberculosis.

Rabbits.—Two rabbits, Nos. 2157 and 2158, were inoculated intraperitoneally with the sputum. No. 2157 (dose, small) was killed after 145 days and showed no sign of tuberculosis; No. 2158 (dose, 0·5 cc.) was also killed after 145 days and showed slight tuberculosis of the omentum and lungs.

(*b*) With culture.

Rabbits.—A series of four rabbits was inoculated with the culture derived from the original material through Guinea-pig 3454, two intravenously and two subcutaneously.

All were killed after 100 days. One intravenous rabbit (dose, 0·1 mg.) showed tuberculosis of the lungs and kidneys and slight tuberculosis of the peritoneum; the other intravenous rabbit (0·01 mg.) and both the subcutaneous rabbits (21·0 mg. and 10·0 mg.) showed only slight retrogressive tuberculosis.

Guinea-pigs.—Two guinea-pigs were inoculated with the culture derived from Guinea-pig 3454, one intraperitoneally and one subcutaneously, each receiving 0·1 mg. They died of general tuberculosis in 20 and 52 days respectively.

SUMMARY.

From the sputum of a man aged 25 suffering from pulmonary tuberculosis a culture was obtained which grows luxuriantly on artificial media, is virulent for the guinea-pig and slightly virulent for the rabbit.

VIRUS H. 126. "A.W."

TUBERCULOSIS OF THE LUNG.

Original material—Sputum.

HISTORY OF PATIENT.

The patient was a youth aged 16 years, admitted to hospital on August 31, 1908.

There was no family history.

The patient had had no serious illness; the present condition commenced gradually since Christmas 1907 with slight cough and shortness of breath; there was no expectoration. The cough and dyspnoea both improved before admission.

In hospital the patient presented signs of cavitation at the left apex with consolidation and infiltration of the whole of the upper lobe of the left lung, and consolidation at the right apex. The temperature showed very marked irregularity; it frequently rose to over 102° F., falling to normal in the morning.

The patient's condition did not improve in hospital and he lost weight.

Sputum was collected for experiment on February 4, 1909.

Use made of Sputum.

The sputum was inoculated into guinea-pigs and examined microscopically; the smear preparation showed no tubercle bacilli.

CULTURES.

A culture was obtained from one of the sternal glands of Guinea-pig 3456 which had been inoculated with the sputum.

Good growths slightly pigmented were obtained on serum, and on glycerin serum the growth was thick yellow and wrinkled.

On glycerin agar a very luxuriant highly-wrinkled creamy membrane was formed. On potato the growth was dry, yellowish-grey and finely warty; a later generation produced a very thick yellow uniformly wrinkled layer.

The surface of a bottle of broth became covered with a greyish-white finely-wrinkled pellicle climbing up the sides of the flask and showing numerous raised creamy colonies on the surface.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guinea-pigs.—Two guinea-pigs, Nos. 3456 and 3457, were inoculated intraperitoneally each with 2·0 cc. of the sputum. The former was killed after 21 days and showed early general tuberculosis, the latter was killed after 55 days and showed general tuberculosis.

(*b*) With culture.

Rabbits.—A series of four rabbits was inoculated with the culture derived from the original material through Guinea-pig 3456, two intravenously (doses 0·1 and 0·01 mg.) and two subcutaneously (doses 13·0 and 10·0 mg.).

One intravenous rabbit died prematurely of heart disease; the remaining three rabbits were killed after 102 days and all showed slight retrogressive tuberculosis.

Guinea-pigs.—Two guinea-pigs were inoculated each with 0·1 mg. of the culture derived from Guinea-pig 3456, one intraperitoneally and one subcutaneously. They died in 14 and 35 days respectively and each showed early general tuberculosis insufficient to account for death.

Kittens.—Three kittens were fed with the culture on three successive days; they received between them 114·0 milligrammes. When killed 99 days later they showed no sign of tuberculosis.

SUMMARY.

From the sputum of a youth aged 16 suffering from pulmonary tuberculosis a culture was obtained which grows luxuriantly on artificial media and is slightly virulent for rabbits.

VIRUS H. 127. "R.R." (*a*).

TUBERCULOSIS OF THE LUNG.

Original material—Sputum.

HISTORY OF PATIENT.

The patient was a man aged 21 years, unmarried, a butcher by occupation, admitted to hospital on February 3, 1909.

There was no family history.

The patient had pneumonia and pleurisy ten months before admission, and had suffered from cough since then.

On admission to hospital the patient presented signs of consolidation of the upper part of the lower lobe of the left lung; the breath sounds were weak; there were no crepitations and no signs of cavitation. The right lung was apparently normal. On March 12 (37 days after admission) bronchial breathing was heard at the left apex. The temperature varied between 97° F. and normal; it had never risen above 99·5° F., and this had been reached on one or two occasions only.

Sputum was collected for experiment on February 11, 1909.

Use made of Sputum.

The sputum was inoculated into guinea-pigs and a rabbit and examined microscopically; in the smear preparation numerous tubercle bacilli of medium length and well stained, and a few long and beaded, were seen.

CULTURES.

Cultures were obtained from Guinea-pigs 3474 and 3475 which had been inoculated with the sputum.

Both strains were tested on the differential media and were found to have identical cultural characters.

On serum they produced thin uniform grey layers; on glycerin serum growth was more abundant than on serum alone, and was moist and whitish and not uniform in thickness, the thinner portions being grey.

On glycerin agar growth was thin, grey, and translucent, with a glazed surface showing here and there greyish-white thickenings and a fine wrinkling.

On potato a thin dull grey layer was produced in which in the fourth and fifth weeks minute pearly-white spherical colonies became visible.

The surface of a bottle of broth was soon covered with a membrane, parts of which were thin and grey and parts greyish-white, which quickly became moist and sank.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guinea-pigs.—Two guinea-pigs, Nos. 3474 and 3475, were inoculated intraperitoneally with the sputum.

They died of early general tuberculosis in 15 and 17 days respectively.

Rabbit.—Rabbit 2159 was inoculated intraperitoneally with the sputum; it died in seven days of peritonitis.

(*b*) With culture.

Calves.—Calf 1585 was inoculated subcutaneously with 50·0 mg. of culture derived from the original material through Guinea-pig 3474, and Calf 1569 subcutaneously with an equivalent dose of the culture derived from the original material through Guinea-pig 3475.

Calf 1585 was killed when very ill after 48 days and showed severe general tuberculosis, and Calf 1569 was killed when well after 105 days and showed slight general tuberculosis.

Rhesus Monkeys.—Two monkeys, Nos. 337 and 339, were inoculated subcutaneously each with 1·0 mg. of the culture derived from the original material through Guinea-pig 3475. They died of general tuberculosis in 27 and 43 days respectively.

Rabbits.—A series of four rabbits was inoculated with the culture derived from Guinea-pig 3474, two intravenously (doses 0·1 mg. and 0·01 mg.) and two subcutaneously (doses 10·0 mg. and 5·0 mg.). They all died of general tuberculosis in from 15 to 47 days.

Two more rabbits were subsequently inoculated subcutaneously each with 10·0 mg. of the culture; they died of general tuberculosis in 41 and 53 days.

A series of two rabbits was inoculated subcutaneously with the culture derived from Guinea-pig 3475, each receiving 10·0 mg. They died of general tuberculosis in 52 and 58 days.

Guinea-pigs.—Two guinea-pigs were inoculated with the culture derived from Guinea-pig 3474, one intraperitoneally (0·1 mg.) the other subcutaneously (0·1 mg.). They died of general tuberculosis in 14 and 33 days respectively.

SUMMARY.

From the sputum of a man aged 21 suffering from pulmonary tuberculosis cultures were obtained which are identical in cultural characters and virulence for the calf, rabbit, and guinea-pig, with the bovine tubercle bacillus.

VIRUS H. 127. "R.R." (*b*).

Original material—Sputum.

Sputum from this case was a second time collected for examination, on April 28, 1909 (76 days after the sputum first investigated).

Use made of Sputum.

The sputum was inoculated into guinea-pigs and rabbits and examined microscopically; in the smear preparation numerous tubercle bacilli short and uniformly stained were seen.

CULTURES.

Cultures were obtained from two of the guinea-pigs, Nos. 3742 and 3743, inoculated with the sputum.

The cultural characters of the two strains were identical with those of the strains obtained from the sputum first investigated (H. 127. "R.R." (*a*)).

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guinea-pigs.—Three guinea-pigs, Nos. 3742, 3743, and 3744, were inoculated intraperitoneally with the sputum. They died of general tuberculosis in from 19 to 28 days.

Rabbits.—Four rabbits, Nos. 2340–2343, were inoculated with the sputum, two intravenously and two subcutaneously. The intravenous rabbits died of general tuberculosis in 32 and 37 days, the subcutaneous rabbits died of acute infections in four and five days.

(*b*) With culture.

Rabbits.—A series of three rabbits was inoculated subcutaneously with culture derived from the original material through Guinea-pig 3743, two receiving 10·0 mg. and one 5·0 mg. They died of general tuberculosis in 50, 54, and 60 days.

Two rabbits were inoculated subcutaneously with culture derived from the original material through Guinea-pig 3742, one receiving 10·0 mg. the other 8·0 mg.

They died of general tuberculosis in 50 and 54 days.

Guinea-pigs.—Two guinea-pigs were inoculated with the culture derived from Guinea-pig 3743, one intraperitoneally (0·1 mg.) and one subcutaneously (0·1 mg.).

The former died of acute tuberculosis in 18 days, the latter of severe general tuberculosis in 54 days.

SUMMARY.

The cultures investigated, obtained from the sputum of a man aged 21, were identical in cultural characters and virulence for the rabbit and guinea-pig with the cultures isolated 76 days previously from the sputum of the same patient.

VIRUS H. 127. "R.R." (*c*).

Original material—Sputum.

Sputum from this case was a third time collected for examination, on June 8, 1909 (117 days after the sputum first investigated).

Use made of Sputum.

The sputum was inoculated into rabbits and examined microscopically; in the smear preparation a moderate number of tubercle bacilli was seen; they were short and darkly stained.

CULTURES.

A culture was obtained direct from the sputum. Its cultural characters were identical with those of the strains obtained from the sputum first investigated (H. 127. "R.R." (*a*)).

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Rabbits.—Rabbits 2366 and 2367 were inoculated intravenously each with a small dose of the sputum; they died of acute infections in 1 and 4 days.

Two more rabbits were subsequently inoculated with the sputum after it had been treated for three hours with a 15 per cent solution of antiformin. No. 2374 received a very small dose intravenously, No. 2375 a small dose intravenously and a large dose subcutaneously. They were killed after 116 days and found healthy.

(*b*) With culture.

Calves.—Two calves, Nos. 1593 and 1595, were inoculated subcutaneously each with 50·0 milligrammes of culture derived from the original material direct; they were killed when dying of general tuberculosis in 34 and 45 days respectively.

Rabbits.—Two rabbits were inoculated subcutaneously with 5·0 milligrammes and 1·0 milligramme respectively of the same culture; they died of general tuberculosis in 56 and 117 days.

SUMMARY.

The culture investigated, obtained direct from the sputum of a man aged 21, was identical in cultural characters and virulence for the calf and rabbit with the culture isolated from this patient's sputum 117 days previously.

VIRUS H. 127. "R.R." (*d*).†

Original material—Sputum.

Sputum from this case was a fourth time collected for examination, on June 9, 1909 (118 days after the sputum first investigated).

Use made of Sputum.

The sputum was inoculated into rabbits and guinea-pigs and examined microscopically; in the smear preparation there were seen numerous tubercle bacilli, short and darkly stained.

CULTURES.

Cultures were obtained from the sputum direct and through the guinea-pig (3784).

The cultural characters of the two strains were identical with those of the two strains obtained from the sputum first investigated (H. 127. "R.R." (*a*)).

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guinea-pigs.—Two guinea pigs, Nos. 3783 and 3784, were inoculated intraperitoneally with the sputum. They died of general tuberculosis in 27 and 20 days respectively.

Rabbits.—Two rabbits, Nos. 2368 and 2369, were inoculated intravenously with a small quantity of the sputum. They died of acute infections in 4 and 5 days.

Subsequently two more rabbits (Nos. 2376 and 2377) were inoculated intravenously with the centrifuged deposit of 2·0 cc. of the sputum after it had been treated for one hour with a 15 per cent solution of antiformin. They were killed after 113 days and found healthy.

(*b*) With culture.

Rabbits.—A series of three rabbits was inoculated subcutaneously with the culture derived from the original material direct, one receiving 40·0 mg., the others 10·0 mg. each. They died of general tuberculosis in 41, 56 and 87 days.

Another series of three rabbits was inoculated subcutaneously with the culture derived from the original material through Guinea-pig 3784, each receiving 10·0 mg. They died of general tuberculosis in 31, 64 and 69 days.

SUMMARY.

The culture investigated, obtained direct from the sputum of a man aged 21, was identical in cultural characters and in virulence for the rabbit with the cultures isolated from the sputum of the patient on three previous occasions.

VIRUS H. 128. "D.D." (*a*).

TUBERCULOSIS OF THE LUNG.

Original material—Sputum.

HISTORY OF PATIENT.

The patient was a man aged 31 years, unmarried, a bricklayer by occupation, admitted to hospital on January 20, 1909.

There was no family history.

The patient had pneumonia on the left side when 20 years old, and pleurisy four months before admission. He had had slight haemorrhages each lasting a few days for some time before admission, and had suffered from night sweats, but had no cough.

In hospital the patient presented signs of infiltration of the whole of the upper lobe of the right lung with consolidation at the apex, and weak breath-sounds with increased vocal resonance over the upper lobe of the left lung; there were no signs of cavities. The temperature showed a slight daily variation but no rise above 99° F. The patient's condition improved in hospital and he gained weight.

Sputum was collected for experiment on February 11, 1909.

Use made of Sputum.

The sputum was inoculated into guinea-pigs and a rabbit and was examined microscopically; in the smear preparation a moderate number of tubercle bacilli was seen.

CULTURES.

A culture was obtained from the sternal gland of guinea-pig 3584 which had been inoculated with the sputum.

It produced on serum thin uniform grey layers; on glycerin serum there was no growth until about the end of the second week when minute discrete colonies appeared; at the end of a month the surface was studded with colonies which had in places become confluent.

No growth has been obtained on agar.

On potato growth was thin grey or greyish-white and finely granular.

On broth a few lace-like islands of growth were formed which became moist and sank.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guinea-pigs.—Two guinea-pigs, Nos. 3477 and 3478, were inoculated intraperitoneally with the sputum. The former died in 5 days of peritonitis, the latter died in 13 days of early general tuberculosis.

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† The patient went to a sanatorium connected with the hospital in August, 1909, and returned home in the following October. He died on December 22, 1909, six months after the last specimen of sputum was collected. No clinical evidence was noted of any disease other than pulmonary tuberculosis. There was no haemoptysis at any time. It was not possible to obtain a post-mortem examination.

Subsequently guinea-pig 3584 was inoculated, also intraperitoneally. It was killed after 21 days and showed early general tuberculosis.

Rabbit.—Rabbit 2160 was inoculated intraperitoneally with the sputum; it died in 2 days of peritonitis.

(*b*) With culture.

Calves.—Two calves, Nos. 1567 and 1579, were inoculated subcutaneously with culture derived from the original material through guinea-pig 3584.

No. 1567, which received 45·0 mg., was killed when very ill after 42 days, and No. 1579 (50·0 mg.) was killed when dying after 41 days; both showed severe general tuberculosis.

Rabbits.—A series of four rabbits was inoculated with the culture derived from guinea-pig 3584, two intravenously (doses 0·1 and 0·01 mg.) and two subcutaneously (doses 30·0 and 10·0 mg.). They all died of general tuberculosis in from 18 to 38 days.

Subsequently two more rabbits were inoculated subcutaneously, each with 1·0 mg. of the culture; they died of general tuberculosis in 41 and 73 days.

Guinea-pigs.—Two guinea-pigs were inoculated with the culture derived from guinea-pig 3584, one intraperitoneally and one subcutaneously, both receiving 0·1 mg. The former died of acute tuberculosis in 13 days, the latter of general tuberculosis in 47 days.

SUMMARY.

From the sputum of a man aged 31 suffering from pulmonary tuberculosis a culture was obtained which is identical in cultural characters and virulence for the calf, rabbit, and guinea-pig with the bovine tubercle bacillus.

VIRUS H. 128. "D.D." (*b*).†

Sputum from this case was a second time collected for examination, on June 9, 1909 (118 days after the sputum first investigated).

Use made of Sputum.

The sputum was inoculated into guinea-pigs and rabbits and examined microscopically; in the smear preparation numerous tubercle bacilli were seen, mostly short and uniformly stained, none beaded.

CULTURES.

Cultures were obtained from the sputum direct and through the guinea-pig (No. 3782).

The cultural characters of the two strains were identical with those of the strains obtained from the sputum first investigated (H. 128. "D.D." (*a*)).

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guinea-pigs.—Two guinea-pigs, Nos. 3781 and 3782, were inoculated intraperitoneally with the sputum. The former died of an acute infection in 7 days, the latter was killed after 20 days and showed moderately severe general tuberculosis.

Rabbits.—Two rabbits, Nos. 2364 and 2365, were inoculated intravenously with the sputum. They died of general tuberculosis in 38 and 49 days respectively.

(*b*) With culture.

Calves.—Calves 1587 and 1589 were inoculated subcutaneously, each with 50·0 mg. of culture obtained directly from the original material. They died of general tuberculosis in 46 and 37 days respectively.

Rabbits. — Two rabbits were inoculated subcutaneously, each with 10·0 mg. of the culture obtained directly from the original material. They died of general tuberculosis in 46 and 47 days.

Two rabbits were inoculated subcutaneously, each with 10·0 mg. of culture derived from the original material through Guinea-pig 3782. They died in 36 and 74 days of general tuberculosis.

SUMMARY.

The cultures investigated, obtained direct and through the guinea-pig from the sputum of a man aged 31, were identical in cultural characters and virulence for the calf and rabbit with the culture isolated from the sputum of the patient 118 days previously.

VIRUS H. 129. "T.M."

TUBERCULOSIS OF THE LUNG.

Original material—Sputum.

HISTORY OF PATIENT.

The patient was a man aged 33 years admitted to hospital on February 3, 1909.

There was no family history.

The patient had an attack of pleurisy four years ago; he suffered from cough, and had an attack of haemoptysis one year ago.

On admission to hospital the patient presented signs of consolidation of the apices of both lungs; there were no signs of a cavity.

The temperature varied from 100° F. to 101° F. on admission but had become normal since the patient had been at rest.

Sputum was collected for examination on February 11, 1909.

Use made of Sputum.

The sputum was inoculated into guinea-pigs and one rabbit and was examined microscopically; in the smear preparation numerous tubercle bacilli, of medium length and many beaded, were seen.

CULTURES.

A culture was obtained from one of the sternal glands of Guinea-pig 3479 which had been inoculated with the sputum.

The growths on serum were good and pigmented; on glycerin serum a thick yellow wrinkled layer with a moist-looking surface was produced. On agar the growth was uniform, very luxuriant, highly-wrinkled and cream-coloured; there was a thick pellicle on the condensation water continuous with the growth on the agar. On potato a thick yellow wrinkled layer was produced.

The surface of a bottle of broth became covered with a thick creamy-white wrinkled membrane.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guinea-pigs.—Two guinea-pigs, Nos. 3479 and 3480, were inoculated intraperitoneally with the sputum. The former was killed after 17 days and showed early slight generalised tuberculosis; the latter died in 21 days of general tuberculosis.

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† The patient went to a sanatorium in August, 1909, whence he returned home early in November, without having improved in any way. On his return he was found to be suffering from haemoptysis and haematemisis with acute enteritis. He died on November 14, 1909, five months after the last specimen of sputum was collected. No post-mortem examination was permitted.

Rabbit.—Rabbit 2161 was inoculated intraperitoneally with the sputum, and died in 24 hours of peritonitis.

(*b*) With culture.

Calf.—Calf 1597 was inoculated subcutaneously with 45·0 mg. of culture derived from the original material through G.P. 3479.

It was killed after 92 days and showed local tuberculosis and a few disseminated lesions.

Rabbits.—A series of four rabbits was inoculated with culture derived from the original material through Guinea-pig 3479, two intravenously and two subcutaneously.

One intravenous animal (dose 0·1 mg.) died of general tuberculosis in 106 days, the other (0·01 mg.) showed general tuberculosis when killed after 119 days.

The subcutaneous rabbits were killed after 119 days; one (dose 12·0 mg.) showed local tuberculosis, severe tuberculosis of the lungs, and slight tuberculosis of the kidneys; the other (dose 10·0 mg.) showed local tuberculosis and tuberculosis of the lungs and kidneys.

From the lung of each of these rabbits a culture was isolated and tested as to its cultural characters and virulence. Each culture grew luxuriantly and produced in two rabbits inoculated subcutaneously slight tuberculosis.

Subsequently two more rabbits were inoculated subcutaneously with the culture derived from Guinea-pig 3479, each receiving 10·0 mg.

They were killed after 149 days and each showed local tuberculosis and slight tuberculosis of the lungs.

Guinea-pigs.—Two guinea-pigs were inoculated with culture derived from the original material through Guinea-pig 3479, one intraperitoneally (0·1 mg.) and one subcutaneously (0·1 mg.).

They died of general tuberculosis in 20 and 39 days respectively.

SUMMARY.

From the sputum of a man aged 33, suffering from pulmonary tuberculosis, a culture was obtained which grows luxuriantly on artificial media, is slightly virulent for the calf and virulent for the guinea-pig. It caused in the rabbit rather more severe disease than is usually produced by a human Group II. bacillus. Cultures recovered from two of the rabbits, however, produced in rabbits subcutaneously inoculated the slight tuberculosis which is characteristic of Group II. viruses.

VIRUS H. 130. "N.B."

TUBERCULOSIS OF THE LUNG.

Original material—Sputum.

HISTORY OF PATIENT.

The patient was a man aged 26 years, formerly in the Marine Artillery, admitted to hospital on February 10, 1909.

There was no family history.

The patient was perfectly well until sixteen months before admission, when he had anal fistula. He was in a naval hospital for eight months and was frequently operated upon; two months after his discharge fistula broke out again and he returned to the naval hospital; while there he had bronchitis and severe haemoptysis, and tubercle bacilli were found in his sputum. He left the naval hospital ten weeks ago, having been invalided out of the Navy; his sputum was frequently stained with blood after leaving.

On admission to hospital the patient presented signs of infiltration with some consolidation of the upper lobes of both lungs, there were no cavities. There was discharge from the fistula. The temperature was regular but subnormal.

Sputum was collected for experiment on February 11, 1909.

Use made of Sputum.

The sputum was inoculated into guinea-pigs and a rabbit and was examined microscopically; in the smear preparation tubercle bacilli were very numerous and were mostly long, beaded, and curved.

CULTURES.

A culture was obtained from one of the sternal glands of Guinea-pig 3481 which had been inoculated with the sputum.

It produced pigmented growths on serum and a thick creamy wrinkled membrane on glycerin serum. On agar a creamy highly-wrinkled membrane, with a thick pellicle on the condensation water, was formed. On potato a moderately thick yellow warty layer was produced.

The surface of a bottle of broth was covered with a greyish-yellow wrinkled membrane mottled with thin grey patches.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guinea-pigs.—Two guinea-pigs, Nos. 3481 and 3482, were inoculated intraperitoneally with the sputum. The former died in 18 days of acute general tuberculosis, the latter was killed after 21 days and showed general tuberculosis.

Rabbit.—Rabbit 2162 was inoculated intraperitoneally with the sputum; it died in 18 days of peritonitis and a subacute infection.

(*b*) With culture.

Rabbits.—A series of four rabbits was inoculated with culture derived from the original material through Guinea-pig 3481, two intravenously and two subcutaneously.

The two intravenous animals (doses 0·1 and 0·01 mg.) died prematurely in 23 and 59 days and showed, one early general tuberculosis, the other slight tuberculosis of the lungs and kidneys

The two subcutaneous animals (doses 22·0 and 10·0 mg.) were killed after 113 days; one showed a local lesion and slight tuberculosis of the lungs, the other a local lesion, slight tuberculosis of the lungs and kidneys, and tuberculosis of one testicle.

Guinea-pigs.—Two guinea-pigs were inoculated with the culture derived from Guinea-pig 3481, one intraperitoneally (dose 0·1 mg.), the other subcutaneously (0·1 mg.).

They died of general tuberculosis in 17 and 91 days respectively.

SUMMARY.

From the sputum of a man aged 26, suffering from pulmonary tuberculosis, a culture was obtained which grows luxuriantly on artificial media, is virulent for the guinea-pig and slightly virulent for the rabbit.

VIRUS H. 131. "M.H."

TUBERCULOSIS OF THE LUNG.

Original material—Sputum.

HISTORY OF PATIENT.

The patient was a man aged 29 years, admitted to hospital on December 9, 1908.

There was no family history.

The patient had influenza seven years previous to admission, and pleurisy two years later. After the latter illness the patient had a winter cough which gradually became worse. Three years before admission he had haemoptysis lasting three days and lost a large quantity of blood, and was in bed three weeks afterwards; he has had slight haemoptysis occasionally since.

On admission to hospital he presented signs of infiltration of the upper and middle lobes of the right lung, and of the apex of the upper lobe of the left lung. There was no fever; the temperature was generally about 97° F. in the morning, rising to normal in the evening.

The patient's condition improved in hospital, and he gained slightly in weight.

Sputum was collected for examination on February 11, 1909.

Use made of Sputum.

The sputum was inoculated into guinea-pigs and a rabbit, and was examined microscopically; in the smear preparation tubercle bacilli in moderate numbers were seen.

CULTURES.

A culture was obtained from one of the sternal glands of Guinea-pig 3483 which had been inoculated with the sputum.

In subculture it produced pigmented layers on serum, and a luxuriant growth with creamy raised ridges on glycerin serum. On agar the fourth and sixth generations produced no growth; the tenth, however, produced a thick creamy uniformly-wrinkled layer. On potato a moderately thick greyish-yellow wrinkled layer was produced. The culture on broth failed.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guinea-pigs.—Two guinea-pigs, Nos. 3483 and 3484, were inoculated intraperitoneally with the sputum. The former was killed after 18 days and showed early general tuberculosis; the latter died in 19 days and showed generalised tuberculosis, not severe.

Rabbit.—Rabbit 2163 was inoculated intraperitoneally with the sputum, and died in three days of peritonitis.

(*b*) With culture.

Rabbits.—A series of four rabbits was inoculated with culture derived from the original material through Guinea-pig 3483, two intravenously (doses 0·1 and 0·01 mg.) and two subcutaneously (doses 17·0 and 10·0 mg.).

One intravenous rabbit died in 41 days of pseudotuberculosis, and showed tuberculosis of the lungs only; the other died in 78 days and showed slight generalised tuberculosis, and the cause of death was not apparent.

One subcutaneous rabbit died in 54 days and showed a local lesion and slight tuberculosis of the lungs and one kidney, the cause of death not being apparent; the other was killed after 114 days and showed a local lesion and no tuberculosis elsewhere.

Guinea-pigs.—Two guinea-pigs were inoculated with the culture derived from Guinea-pig 3483, one intraperitoneally and one subcutaneously, each receiving 0·1 mg.

They died of general tuberculosis in 35 and 61 days respectively.

SUMMARY.

From the sputum of a man aged 29 suffering from pulmonary tuberculosis a culture was obtained which grows luxuriantly on artificial media, is virulent for the guinea-pig and slightly virulent for the rabbit.

VIRUS H. 132. "O.O."

TUBERCULOSIS OF THE LUNG.

Original material—Sputum.

HISTORY OF PATIENT.

The patient was a youth aged 18 years admitted to hospital on December 18, 1908.

One brother and one sister died of "consumption" when aged 20 and 22 years respectively, and the patient's mother suffered from cough.

The patient had been fairly healthy until twelve months before admission, when he had an attack of tonsilitis; subsequently he had a cough (with not much expectoration), and a severe attack of haemoptysis five months before admission; three months later he had a slighter attack of haemorrhage.

In hospital the patient presented signs of infiltration of the apices of both lungs with consolidation at the right apex; there were no cavities. The temperature was practically normal. The patient's condition improved and he gained weight; he was sent to a convalescent home on March 12, 1909.

Sputum was collected for examination on February 11, 1909.

Use made of Sputum.

The sputum was inoculated into guinea-pigs and a rabbit and examined microscopically; in the smear preparation numerous long beaded tubercle bacilli were seen.

CULTURES.

A culture was obtained from one of the sternal glands of Guinea-pig 3485, which had been inoculated with the sputum.

On serum it produced pigmented layers, and on glycerin serum a thick yellow wrinkled membrane.

On agar no growth was produced with the 4th and 8th generations, but the 9th produced a thick creamy wrinkled layer, and a thick wrinkled pellicle on the condensation water of the tube. On glycerin potato a moderately thick creamy warty layer was produced.

The surface of a bottle of broth became almost completely covered with a creamy-white leathery membrane thrown into large folds, the rest of the surface being covered with a thinner translucent membrane; in another case a leathery membrane thrown into large folds completely covered the surface of a bottle of broth.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guinea-pigs.—Two guinea-pigs, Nos. 3485 and 3486, were inoculated intraperitoneally with the sputum. They died in 18 and 20 days respectively of general tuberculosis.

Rabbit.—Rabbit 2164 was inoculated intraperitoneally with the sputum, and died in three days of peritonitis.

(*b*) With culture.

A series of four rabbits was inoculated with the culture derived from the original material through Guinea-pig 3485, two intravenously and two subcutaneously.

One of those intravenously inoculated (dose 0·1 mg.) died in 117 days of chronic general tuberculosis, the other (dose 0·01 mg.) was killed after 119 days and showed chronic general tuberculosis.

The rabbits subcutaneously inoculated were killed after 119 days; one (dose 18·0 mg.) showed a local lesion, slight tuberculosis of the lungs, and tuberculosis of the mamma, the other (dose 10·0 mg.) a local lesion and no tuberculosis elsewhere.

Guinea-pigs.—Two guinea-pigs were inoculated with culture derived from the original material through Guinea-pig 3485, one intraperitoneally (0·1 mg.) and one subcutaneously (0·1 mg.). They died of general tuberculosis in 22 and 52 days respectively.

SUMMARY.

From the sputum of a youth aged 18 suffering from pulmonary tuberculosis a culture was obtained which grows luxuriantly on artificial media, is virulent for the guinea-pig and slightly virulent for the rabbit.

VIRUS H. 133. "P.K."

TUBERCULOSIS OF THE LUNG.

Original material—Sputum.

HISTORY OF PATIENT.

The patient was a man aged 24 years, admitted to hospital on January 15, 1909.

His father died of some chest complaint; his mother and sisters were alive and well.

The patient had always been well until August 1907, when he had a slight haemorrhage; he went on with his work (as a postman) till five months before admission when he had another small haemorrhage. Later on he had a third and more severe attack of haemoptysis. He had had no cough at any time.

In hospital the patient presented signs of consolidation of the upper lobes of both lungs; his temperature was practically normal. His condition improved and he gained weight, and he was sent to a convalescent home on March 5, 1909.

Sputum was collected for examination on February 4, 1909.

Use made of Sputum.

The sputum was inoculated into guinea-pigs and examined microscopically; no tubercle bacilli were seen in the smear preparation.

CULTURES.

A culture was obtained from the sternal gland of Guinea-pig 3449 which had been inoculated with the sputum.

On serum the first few generations were thin and grey; later generations grew well with the formation of a yellow pigment.

Growth on glycerin serum was abundant creamy-white and in parts warty.

On agar a thick creamy finely-wrinkled layer was formed.

On potato growth was very thick wrinkled and irregularly heaped up and of a brownish-yellow colour.

The surface of broth became nearly covered with islands of growth which were creamy and warty near the serum, greyish-white elsewhere.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guinea-pigs.—Two guinea-pigs, Nos. 3448 and 3449, were inoculated intraperitoneally with the sputum.

No. 3448 was killed after 17 days and showed no tuberculosis, and No. 3449 was killed after 55 days and showed slight general tuberculosis.

(*b*) With culture.

Calves.—Two calves, Nos. 1575 and 1581, were inoculated subcutaneously each with 50·0 mg. of culture derived from the original material through Guinea-pig 3449.

They were both killed after 101 days; one showed local tuberculosis and one calcareous tubercle in an ileo-colic gland, the other local tuberculosis and five calcareous foci in the mesenteric glands.

Rhesus Monkeys.—Two monkeys, Nos. 329 and 331, were inoculated subcutaneously each with 1·0 mg. of culture derived from Guinea-pig 3449.

No. 329 died of general tuberculosis in 25 days; No. 331 died in 30 days and showed slight general tuberculosis insufficient to account for death.

Rabbits.—A series of five rabbits was inoculated with culture derived from the original material through Guinea-pig 3449, three intravenously (doses 0·1 and 0·01 mg.) and two subcutaneously (doses 17·0 and 10·0 mg.).

All were killed after 106 days; four showed slight generalised retrogressive tuberculosis, the fifth, one of those inoculated subcutaneously, had local tuberculosis only.

Subsequently a second series of rabbits was inoculated with the culture derived from Guinea-pig 3449, three intravenously (doses 1·0 and 0·1 mg.) and one subcutaneously (dose 10·0 mg.).

One intravenous rabbit died in 69 days of tuberculosis of the lungs and kidneys, another in 20 days of early general tuberculosis. The remaining animals, one intravenously and one subcutaneously inoculated, were killed after 103 days and each showed slight generalised retrogressive tuberculosis.

Guinea-pigs.—Four guinea-pigs were inoculated with the culture derived from Guinea-pig 3449, two intraperitoneally and two subcutaneously, each with 0.1 mg.

They all died of general tuberculosis in from 13 to 40 days.

SUMMARY.

From the sputum of a man aged 24 suffering from pulmonary tuberculosis a culture was obtained which grows luxuriantly on artificial media, is virulent for the rhesus monkey and guinea-pig, and slightly virulent or the calf and rabbit.

VIRUS H. 134. "K.K."

TUBERCULOSIS OF THE LUNG.

Original material—Sputum.

HISTORY OF PATIENT.

The patient was a man aged 20 years admitted to hospital on October 30, 1908.

There was no family history.

The patient had had no serious illness; he was in bed for a few days with "influenza" about six months before admission; on admission he stated that he had had bronchitis for three or four months.

In hospital the patient presented signs of consolidation of the apices of both lungs and infiltration of the remainder of the left upper lobe and of the left lower lobe; there were no cavities. The temperature was normal.

The patient's condition improved under treatment and he gained weight.

Sputum was collected for examination on February 11, 1909.

Use made of Sputum.

The sputum was inoculated into guinea-pigs and a rabbit and examined microscopically; in a smear preparation numerous tubercle bacilli were seen, long and short, curved and uniformly stained.

CULTURES.

A culture was obtained from one of the sternal glands of Guinea-pig 3489 which had been inoculated with the sputum.

On serum the growths were abundant and of a rich yellow colour. On glycerin serum growth was more luxuriant than on serum alone. On agar a thick creamy closely-wrinkled layer was formed. On potato the growths were creamy, warty, and of moderate thickness.

The surface of a bottle of broth became nearly covered with a thick leathery yellow warty wrinkled membrane.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guinea-pigs.—Two guinea-pigs, Nos. 3489 and 3490, were inoculated intraperitoneally with the sputum. No. 3490 died in 9 days (the cause of death was not apparent), and No. 3489 died in 13 days and showed very early tuberculosis.

Rabbit.—Rabbit 2166 was inoculated intraperitoneally with the sputum; it was killed after 139 days and showed very slight tuberculosis of the omentum and lungs.

(*b*) With culture.

Rabbits.—A series of four rabbits was inoculated with culture derived from the original material through Guinea-pig 3489, two intravenously (doses 0·1 and 0·01 mg.) and two subcutaneously (doses 50·0 and 10·0 mg.).

The intravenous rabbits died in 57 and 34 days; one showed slight general tuberculosis insufficient to account for death, the other tuberculosis of the lungs only, cellulitis being the cause of death.

The subcutaneous rabbits were killed after 105 days and each showed slight retrogressive generalised tuberculosis.

Guinea-pigs.—Two guinea-pigs were inoculated each with 0·1 mg. of the culture derived from Guinea-pig 3489, one intraperitoneally, the other subcutaneously. They died of general tuberculosis in 30 and 44 days respectively.

SUMMARY.

From the sputum of a man aged 20 suffering from pulmonary tuberculosis a culture was obtained which grows luxuriantly on artificial media, is virulent for guinea-pigs and slightly virulent for rabbits.

VIRUS H. 135. "E.E."

TUBERCULOSIS OF THE LUNG.

Original material—Sputum.

HISTORY OF PATIENT.

The patient was a man aged 21 years admitted to hospital on November 30, 1908.

There was no family history.

The patient's present condition started with cough and some haemoptysis six months before admission; the cough had persisted but there had been no further haemorrhage.

In hospital the patient presented signs of infiltration of the apex of the upper lobe and of the lower lobe of the right lung, and slight infiltration of the upper lobe of the left lung; there were no cavities. The temperature was irregular but there was no marked pyrexia.

Sputum was collected for examination on February 11, 1909.

Use made of Sputum.

The sputum was inoculated into guinea-pigs and a rabbit and examined microscopically; in the smear preparation there were numerous tubercle bacilli long and short, mostly curved, and many short straight uniformly-stained ones.

CULTURES.

A culture was obtained from one of the sternal glands of guinea-pig 3491 which had been inoculated with the sputum.

The growths on serum were pigmented and on glycerin-serum two or three times as thick as on serum and wrinkled.

On agar a thick creamy-white uniformly-wrinkled membrane was formed. Growth on potato was yellow, very thick and heaped-up and coarsely wrinkled.

The surface of broth became covered with a non-wrinkled pellicle which was mainly yellowish and opaque the rest being grey and translucent. The whole surface of a flask of whey became covered with a thick creamy uniformly-wrinkled membrane.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guinea-pigs.—Two guinea-pigs, Nos. 3491 and 3492, were inoculated intraperitoneally with the sputum. They were killed after 18 and 21 days respectively and showed general tuberculosis.

Rabbit.—Rabbit 2167 was inoculated intraperitoneally with the sputum, and died in 12 days of septic peritonitis.

(*b*) With culture.

Rabbits.—A series of four rabbits was inoculated with culture derived from the original material through guinea-pig 3491, two intravenously and two subcutaneously.

The intravenous rabbits were killed after 113 days; one (dose 0·1 mg.) showed chronic general tuberculosis, the other (dose 0·01 mg.) one tubercle in a kidney and no tuberculosis elsewhere.

The two subcutaneous rabbits (doses 16·0 and 10·0 mg.) died prematurely each in 12 days and showed no tuberculosis.

Two more rabbits were therefore inoculated subcutaneously with the culture. One which received 44·0 mg. died prematurely in 13 days, the other which received 10·0 mg. was killed after 106 days and showed a local lesion and no tuberculosis elsewhere.

Guinea-pigs.—Two guinea-pigs were inoculated each with 0·1 mg. of the culture derived from guinea-pig 3491, one intraperitoneally the other subcutaneously.

They died of general tuberculosis in 21 and 51 days respectively.

SUMMARY.

From the sputum of a man aged 21 suffering from pulmonary tuberculosis a culture was obtained which grows luxuriantly on artificial media, is virulent for guinea-pigs and slightly virulent for rabbits.

VIRUS H. 136. "X.B."

TUBERCULOSIS OF THE LUNG.

Original material—Sputum.

HISTORY OF PATIENT.

The patient was a man aged 28 years admitted to hospital on December 16, 1908.

There was no family history.

The patient had had a pain in his chest since Christmas 1907, and had frequently suffered from cough, which had been worse than usual for two months before admission; he had an attack of haemoptysis three months before admission, and slight haemorrhage two months later.

On admission to hospital the patient had an attack of haemoptysis; he presented signs of cavities at the apices of both lungs and of consolidation of the lower lobe of the right lung. The temperature was practically normal.

The patient's condition improved in hospital and he gained weight.

Sputum was collected for examination on February 19, 1909.

Use made of Sputum.

The sputum was inoculated into guinea-pigs and examined microscopically; in the smear preparation a few tubercle bacilli were seen.

CULTURES.

A culture was obtained from one of the sternal glands of guinea-pig 3522, which had been inoculated with the sputum.

The culture produced on serum good pigmented growths, and on glycerin-serum thick creamy wrinkled layers much better than on serum alone. On agar a thick creamy highly-wrinkled continuous layer was formed; on potato the growth was moderately thick, creamy and wrinkled.

The surface of a bottle of broth quickly became covered with a pellicle which was partly opaque and creamy-white, partly thin grey and translucent.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guinea-pigs.—Two guinea-pigs, Nos. 3522 and 3523, were inoculated intraperitoneally with the sputum. No. 3522 was killed after 18 days and showed early general tuberculosis not severe, and No. 3523 was killed after 29 days and showed general tuberculosis.

(*b*) With culture.

Rabbits.—A series of five rabbits was inoculated with culture derived from the original material through guinea-pig 3522, two intravenously and three subcutaneously.

One intravenous rabbit (dose 0·1 mg.) died in 16 days of tuberculosis of the lungs; the other (dose 0·01 mg.) died in 50 days and showed slight generalised tuberculosis, the cause of death was not apparent.

Two subcutaneous rabbits (doses 10·0 mg. each) died prematurely in 36 and 42 days and showed slight generalised tuberculosis; the third (dose 100·0 mg.) was killed after 119 days and showed slight generalised retrogressive tuberculosis.

Guinea-pigs.—Two guinea-pigs were inoculated with the culture derived from the original material through Guinea-pig 3522, one intraperitoneally and one subcutaneously, each receiving 0·1 mg.

They died of general tuberculosis in 21 and 51 days respectively.

SUMMARY.

From the sputum of a man aged 28 suffering from pulmonary tuberculosis a culture was obtained which grows luxuriantly on artificial media, is virulent for guinea-pigs and slightly virulent for rabbits.

VIRUS H. 137. "O.B."

TUBERCULOSIS OF THE LUNG.

Original material—Sputum.

HISTORY OF PATIENT.

The patient was a man aged 20 years admitted to hospital on January 8, 1909.

There was no family history.

The patient had had a cough for four months; previous to this, except for an attack of quinsy, there was no definite history of illness.

In hospital the patient presented signs of consolidation of the upper lobe of the right lung and of infiltration of the lower lobe of the right lung and the upper lobe of the left lung. The temperature was normal.

Sputum was collected for examination on February 19, 1909.

Use made of Sputum.

The sputum was inoculated into guinea-pigs and examined microscopically; in the smear preparation a moderate number of tubercle bacilli were seen, varying in size, some beaded some uniformly stained and of various lengths.

CULTURES.

A culture was obtained from one of the sternal glands of guinea-pig 3524 which had been inoculated with the sputum.

The culture produced on serum good pigmented growths and on glycerin serum a creamy-yellow wrinkled membrane.

On agar thick creamy wrinkled layers were formed, and on potato a moderately thick creamy-white warty and in places wrinkled layer was produced.

The surface of a bottle of broth quickly became covered with a greyish-white wrinkled membrane studded with raised opaque colonies.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guinea-pigs.—Two guinea-pigs, Nos. 3524 and 3525, were inoculated intraperitoneally with the sputum. They were killed after 18 and 29 days respectively; the former showed very slight early general tuberculosis, the latter general tuberculosis not severe.

(*b*) With culture.

Rabbits.—A series of four rabbits was inoculated with culture derived from the original material through guinea-pig 3524, two intravenously (doses 0·1 and 0·01 mg.) and two subcutaneously (doses 20·0 and 10·0 mg.).

One subcutaneous rabbit died in 35 days and showed slight disseminated tuberculosis insufficient to account for death; the remaining three rabbits were killed after 126 days and each showed slight retrogressive tuberculosis.

Guinea-pigs.—Two guinea-pigs were inoculated with the culture derived from guinea-pig 3524, one intraperitoneally (0·1 mg.) and one subcutaneously (0·1 mg.).

They died of general tuberculosis in 28 and 50 days respectively.

SUMMARY.

From the sputum of a man aged 20 suffering from pulmonary tuberculosis a culture was obtained which grows luxuriantly on artificial media, is virulent for guinea-pigs and slightly virulent for rabbits.

VIRUS H. 138. "C.C."

TUBERCULOSIS OF THE LUNG.

Original material—Sputum.

HISTORY OF PATIENT.

The patient was a man aged 29 years admitted to hospital on January 18, 1909.

His father died of phthisis shortly after the patient was born; there was no other family history of tuberculosis.

The patient had had a cough for three years previous to admission, with occasionally coloured sputum.

In hospital he presented signs of a cavity in the left apex, consolidation of the right apex, and infiltration of practically the whole of both lungs. The temperature was normal.

Sputum was collected for examination on February 19, 1909.

Use made of Sputum.

The sputum was inoculated into guinea-pigs and examined microscopically; in the smear preparations numerous tubercle bacilli, many long curved and beaded, were seen.

CULTURES.

A culture was obtained from one of the sternal glands of guinea-pig 3526 which had been inoculated with the sputum.

It produced on serum good pigmented growths; on glycerin-serum a luxuriant growth in places thick, moist and of a yellow colour; on glycerin agar a creamy wrinkled not quite uniform layer; and on potato a very thick yellow wrinkled layer.

On broth a thick leathery yellow membrane was produced which covered more than three-quarters of the surface.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guinea-pigs.—Two guinea-pigs, Nos. 3526 and 3527, were inoculated intraperitoneally with the sputum. No. 3527 died in 6 days, the cause of death was not apparent; No. 3526 was killed after 18 days and showed early slight general tuberculosis.

(*b*) With culture.

Rabbits.—A series of four rabbits was inoculated with culture derived from the original material through guinea-pig 3526, two intravenously (doses 0·1 and 0·01 mg.) and two subcutaneously (doses 35·0 and 10·0 mg.).

They were killed after 124 days and all showed slight generalised retrogressive tuberculosis.

Guinea-pigs.—Two guinea-pigs were inoculated with the culture derived from guinea-pig 3526, one intraperitoneally and one subcutaneously, each receiving 0·1 mg.

They died of general tuberculosis in 19 and 42 days respectively.

SUMMARY.

From the sputum of a man aged 29, suffering from pulmonary tuberculosis, a culture was obtained which grows luxuriantly an artificial media, is virulent for guinea-pigs and slightly virulent for rabbits.

VIRUS H. 139. "K.H."

TUBERCULOSIS OF THE LUNG.

Original material—Sputum.

HISTORY OF PATIENT.

The patient was a man aged 23 years admitted to hospital on November 28, 1908.

There was no family history.

Two years before admission the patient had frequent colds from getting wet; he subsequently suffered from cough, and had an attack of haemoptysis three months before admission.

In hospital the patient presented signs of a cavity in the upper lobe of the left lung, and of infiltration (and ? consolidation) at the apex of the right lung.

The temperature on admission varied between 101° F. and 102° F., but gradually fell to the normal.

Sputum was collected for examination on February 19, 1909.

Use made of Sputum.

The sputum was inoculated into guinea-pigs and examined microscopically; in the smear preparation a few tubercle bacilli were seen.

CULTURES.

A culture was obtained from one of the sternal glands of Guinea-pig 3529 which had been inoculated with the sputum.

On serum the culture produced very good deeply pigmented layers; on glycerin-serum growth was better than on serum alone, but more irregular and not so pigmented; on agar a moderately thick creamy wrinkled layer was formed, and on potato a moderately thick warty layer pigmented yellow.

The surface of a bottle of broth became covered with a finely-wrinkled greyish-white translucent and in places warty membrane.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guinea-pigs.—Two guinea-pigs, Nos. 3528 and 3529, were inoculated intraperitoneally with the sputum. They died of general tuberculosis in 29 and 18 days respectively.

(*b*) With culture.

Rabbits.—A series of four rabbits was inoculated with culture derived from the original material through Guinea-pig 3529, two intravenously (doses 0·1 and 0·01 mg.) and two subcutaneously (doses 20·0 and 10·0 mg.).

One intravenous rabbit died in 16 days and showed early general tuberculosis; death resulted from rupture of the spleen. The other three rabbits were killed after 124 days, and each showed slight generalised retrogressive tuberculosis.

Guinea-pigs.—Two guinea-pigs were inoculated with the culture derived from Guinea-pig 3529.

One inoculated intraperitoneally with 0·1 mg. died in 16 days, and showed early general tuberculosis insufficient to account for death; the other inoculated subcutaneously with 0·1 mg. died of general tuberculosis in 44 days.

SUMMARY.

From the sputum of a man aged 23, suffering from pulmonary tuberculosis, a culture was obtained which grows luxuriantly on artificial media, is virulent for guinea-pigs and slightly virulent for rabbits.

VIRUS H. 140. "J.J."

TUBERCULOSIS OF THE LUNG.

Original material—Sputum.

HISTORY OF PATIENT.

The patient was a woman aged 22 years admitted to hospital on March 5, 1909.

There was no family history of phthisis, but the patient's brothers and sisters were said to have "weak chests."

The patient always had a "weak chest." She suffered from pneumonia when eight years old, and from bronchitis in December 1907 and June 1908. The present illness started with cough after the first attack of bronchitis.

In hospital the patient presented signs of cavities in the upper lobes of both lungs. The temperature was normal.

Sputum was collected for examination on March 5, 1909.

Use made of Sputum.

The sputum was inoculated into guinea-pigs and examined microscopically; in the smear preparation tubercle bacilli were numerous, the majority were short and uniformly stained.

CULTURES.

A culture was obtained from one of the sternal glands of Guinea-pig 3607 which had been inoculated with the sputum.

The culture produced pigmented layers on serum, a luxuriant growth on glycerin serum, a very luxuriant creamy wrinkled uniform layer on agar, and yellowish-grey finely-wrinkled and granular layers on potato.

The surface of a bottle of broth became covered with a wrinkled membrane which was partly grey and translucent and partly creamy-white, opaque, and warty. On a flask of whey a very thick uniformly-wrinkled cream-coloured membrane was produced.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guinea-pigs.—Two guinea-pigs, Nos. 3607 and 3608, were inoculated intraperitoneally with the sputum. No. 3607 was killed after 21 days and showed early general tuberculosis; No. 3608 died of general tuberculosis in 40 days.

(*b*) With culture.

Rabbits.—A series of four rabbits was inoculated with culture derived from the original material through Guinea-pig 3607, two intravenously (doses 0·1 and 0·01 mg.) and two subcutaneously (doses 100·0 and 10·0 mg.).

One rabbit, inoculated intravenously with 0·1 mg., died of general tuberculosis in 22 days; the remaining three rabbits were killed after 110 days, and each showed slight generalized retrogressive tuberculosis.

Guinea-pigs.—Two guinea-pigs were inoculated with the culture derived from Guinea-pig 3607, one intraperitoneally, the other subcutaneously, each receiving 0·1 mg.

They died of general tuberculosis in 26 and 51 days respectively.

Kittens.—Four young kittens were inoculated, each with 1·0 mg. of the culture derived from Guinea-pig 3607, two intraperitoneally and two subcutaneously.

They were killed after 162 days; the former showed minute tubercles in the omentum only, the latter local tuberculosis only.

Mice.—Three mice were inoculated each with 10·0 mg. of the culture derived from Guinea-pig 3607, two intraperitoneally, and one subcutaneously.

The two mice inoculated intraperitoneally died of acute tuberculosis in 8 and 26 days; the mouse inoculated subcutaneously died of pneumonia in 37 days and showed no sign of tuberculosis; tubercle bacilli were found in a smear from the lung, none in smears from the abdominal organs.

SUMMARY.

From the sputum of a woman aged 22, suffering from pulmonary tuberculosis, a culture was obtained which grows luxuriantly on artificial media, is virulent for guinea-pigs and slightly virulent for rabbits.

VIRUS H. 141. "C.H."

TUBERCULOSIS OF THE LUNG.

Original material—Sputum.

HISTORY OF PATIENT.

The patient was a man aged 25 admitted to hospital on February 8, 1909.

There was no family history.

The patient's illness commenced in July, 1908, with an attack of pleurisy; he was invalided out of the Navy suffering from phthisis, and had three attacks of haemoptysis during the month preceding admission.

In hospital the patient presented signs of a cavity in the upper lobe of the right lung with consolidation below, and infiltration of the whole of the left lung. The temperature was normal.

Sputum was collected for examination on February 19, 1909.

Use made of Sputum.

The sputum was inoculated into guinea-pigs and examined microscopically; in the smear preparation moderately numerous tubercle bacilli, mostly long curved and beaded, were seen.

CULTURES.

A culture was obtained from one of the sternal glands of Guinea-pig 3532, which had been inoculated with the sputum.

The culture produced on serum good pigmented growths, on glycerin serum a luxuriant creamy layer irregular in thickness, on agar a thick uniformly-wrinkled creamy layer, and on potato a thick uniformly wrinkled brownish-yellow layer.

The surface of a bottle of broth became covered with a thick wrinkled creamy pellicle.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guinea-pigs.—Two guinea-pigs, Nos. 3532 and 3533, were inoculated intraperitoneally with the sputum. No. 3533 died of a sub-acute infection in four days, and No. 3532 died of early general tuberculosis in 18 days.

(*b*) With culture.

Rabbits.—A series of four rabbits was inoculated with culture derived from the original material through Guinea-pig 3532, two intravenously (doses 0·1 and 0·01 mg.) and two subcutaneously (doses 30·0 and 10·0 mg).

One rabbit, inoculated intravenously, died in 45 days and showed scattered miliary tubercles in the lungs and kidneys; the cause of death was not apparent. The remaining three rabbits were killed after 127 days, and all showed slight generalised retrogressive tuberculosis.

Guinea-pigs.—Two guinea-pigs were inoculated each with 0·1 mg. of the culture derived from Guinea-pig 3532, one intraperitoneally and the other subcutaneously.

They died of general tuberculosis in 30 and 57 days respectively.

SUMMARY.

From the sputum of a man aged 25, suffering from pulmonary tuberculosis, a culture was obtained which grows luxuriantly on artificial media, is virulent for guinea-pigs and slightly virulent for rabbits.

VIRUS H. 142. "Q.H."

TUBERCULOSIS OF THE LUNG.

Original material—Sputum.

HISTORY OF PATIENT.

The patient was a man aged 22 years, admitted to hospital on February 1, 1909.

There was no family history.

The patient had been healthy until within the last few years when he had had a winter cough; the cough had been worse during the eight months immediately preceding admission.

In hospital the patient presented signs of a cavity at the apex of the right lung, and of consolidation and a cavity in the middle lobe of the right lung. The temperature was normal.

Sputum was collected for examination on February 19, 1909.

Use made of Sputum.

The sputum was inoculated into guinea-pigs and examined microscopically; in the smear preparation very numerous beaded tubercle bacilli were seen.

CULTURES.

A culture was obtained from one of the sternal glands of Guinea-pig 3534 which had been inoculated with the sputum.

The culture produced on serum good pigmented growths, on glycerin serum a luxuriant creamy wrinkled almost uniform layer, on agar a thick creamy wrinkled continuous membrane, and on potato a thick creamy wrinkled layer.

The surface of a bottle of broth became covered with a greyish-white finely-wrinkled pellicle containing many yellow warty patches.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guinea-pigs. — Two guinea-pigs, Nos. 3534 and 3535, were inoculated intraperitoneally with the sputum. The former died in 15 days of early general tuberculosis, the latter was killed after 29 days and showed slight general tuberculosis.

(*b*) With culture.

Rabbits.—A series of four rabbits was inoculated with culture derived from the original material through Guinea-pig 3534, two intravenously (doses 0·1 and 0·01 mg.) and two subcutaneously (doses 10·0 and 5·0 mg.). All were killed after 125 days.

The intravenous rabbits each showed tuberculosis of lungs, kidneys, and a lachrymal gland, and one showed tuberculosis of the left eye.

The subcutaneous rabbits each showed a local lesion and slight retrogressive tuberculosis of the lungs.

Guinea-pigs. — Two guinea-pigs were inoculated each with 0·1 mg. of the culture derived from Guinea-pig 3534.

One inoculated intraperitoneally died in 19 days and showed early general tuberculosis not severe, the other inoculated subcutaneously died in 47 days of general tuberculosis.

SUMMARY.

From the sputum of a man aged 22, suffering from pulmonary tuberculosis, a culture was obtained which grows luxuriantly on artificial media, is virulent for the guinea-pig and slightly virulent for the rabbit.

VIRUS H. 143. "L.L."

TUBERCULOSIS OF THE LUNG.

Original material—Sputum.

HISTORY OF PATIENT.

The patient was a man aged 22 years admitted to hospital on February 12, 1909.

There was no family history.

There was no definite history of the onset of the illness; the patient had had a cough during nine months before admission, and slight haemoptysis occasionally during twelve months preceding admission; the haemorrhage was never severe, the sputum being merely stained.

In hospital the patient presented signs of a cavity in the upper lobe of the right lung, consolidation of the lower lobe of the right lung, and infiltration of the upper lobe of the left lung. The temperature was very irregular, generally subnormal in the morning, and rising in the evening to 100° F. or 101° F.

The patient's condition did not improve in hospital and he lost weight.

Sputum was collected for examination on February 19, 1909.

Use made of Sputum.

The sputum was inoculated into guinea-pigs and examined microscopically; in the smear preparation numerous tubercle bacilli were seen.

CULTURES.

A culture was obtained from one of the sternal glands of Guinea-pig 3536 which had been inoculated with the sputum.

Subcultures on serum were good and slightly pigmented; on glycerin serum they were much better than on serum alone. On agar a very luxuriant creamy uniformly wrinkled layer was produced. A thick creamy wrinkled layer was obtained on potato.

The surface of a bottle of broth became covered with a pellicle which was partly smooth leathery and yellowish-white and thrown into large folds, and partly thin and grey.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guinea-pigs.—Two guinea-pigs, Nos. 3536 and 3537, were inoculated intraperitoneally with the sputum. The former was killed after 18 days and showed early general tuberculosis; the latter died in 27 days of general tuberculosis.

(*b*) With culture.

Calf.—Calf 1601 was inoculated subcutaneously with 68·0 mg. of culture derived from the original material through Guinea-pig 3536.

It was killed after 91 days and showed slight disseminated tuberculosis.

Rabbits.—A series of four rabbits was inoculated with culture derived from the original material through Guinea-pig 3536, two intravenously and two subcutaneously.

One intravenous rabbit (0·1 mg.) died in 37 days of cellulitis and showed slight tuberculosis of the lungs and kidneys, the other (0·01 mg.) was killed after 126 days and showed slight generalised tuberculosis apparently progressive on the pleura. Cultures obtained from a pleural growth and a kidney of this rabbit were identical in cultural characters and virulence for rabbits with the bovine tubercle bacillus.

One subcutaneous rabbit (6·0 mg.) died prematurely in eight days, the cause of death was not apparent; the other (10·0 mg.) died of general tuberculosis in 89 days. A culture obtained from the lung of this rabbit grew luxuriantly and produced slight tuberculosis in three rabbits.

Subsequently two more rabbits were inoculated subcutaneously with the culture derived from Guinea-pig 3536, each receiving 10·0 mg.

They were killed after 149 days; one showed a local lesion, moderately severe tuberculosis of the lungs and very slight tuberculosis of the kidneys, the other very slight generalised tuberculosis.

Guinea-pigs.—Two guinea-pigs were inoculated with the culture derived from Guinea-pig 3536, one intraperitoneally, the other subcutaneously, each receiving 0·1 mg.

They died of general tuberculosis in 27 and 47 days respectively.

Kittens.—Two young kittens were inoculated intraperitoneally, each with 10·0 mg. of the culture derived from Guinea-pig 3536. They were killed after 146 days and showed no sign of tuberculosis.

Mice.—Two mice were inoculated with the culture derived from Guinea-pig 3536, one intraperitoneally (dose 1·0 mg.) and one subcutaneously (dose 10·0 mg.). The former died of acute tuberculosis in 103 days, the latter died also in 103 days, but showed no naked-eye evidence of tuberculosis; a few tubercle bacilli were found in smears from the lung, none in the abdominal organs.

SUMMARY.

From the sputum of a man aged 22, suffering from pulmonary tuberculosis, a culture was obtained which grows luxuriantly on artificial media is slightly virulent for the calf and virulent for the guinea-pig. It produced in two out of three rabbits inoculated subcutaneously more severe disease than is usually produced by a human tubercle bacillus (Group II). Progressive tuberculosis was produced in one of the rabbits inoculated intravenously and bovine tubercle bacilli were cultivated from its lesions; the disease in this animal was probably due to a spontaneous infection with bovine tubercle bacilli since the culture recovered from one of the subcutaneously inoculated rabbits in the same series exhibited the characteristics of a human Group II bacillus, and other animals (a calf, kittens, and rabbits) subsequently inoculated with the original culture gave no indication of the presence of bacilli of higher virulence than the human tubercle bacillus.

VIRUS H. 144. "D.B."

TUBERCULOSIS OF THE LUNG.

Original material—Sputum.

HISTORY OF PATIENT.

The patient was a man aged 29 years admitted to hospital on January 4, 1909.

There was no family history.

The patient was in good health until about thirteen months before admission, when he caught a cold through getting wet and had had a cough ever since; he had an attack of haemoptysis twelve months before admission.

On admission to hospital the patient presented signs of a cavity at the apex of the right lung, and of consolidation of the apex of the left lung; there was severe cough and much expectoration; the temperature was normal.

Sputum was collected for examination on February 19, 1909.

Use made of Sputum.

The sputum was inoculated into guinea-pigs and examined microscopically; a moderate number of tubercle bacilli were seen in the smear preparation.

CULTURES.

A culture was obtained from one of the sternal glands of Guinea-pig 3614, which had been inoculated with the sputum.

Subcultures on serum were good and slightly pigmented; on glycerin serum they were much better than on serum alone.

The surface of a tube of agar became covered though not uniformly with a creamy warty and in places wrinkled layer. On potato thick yellow wrinkled and warty layers were produced.

On broth a not very thick grey membrane studded with yellow granules was formed.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guinea-pigs.—Two guinea-pigs, Nos. 3538 and 3539, were inoculated intraperitoneally with the sputum. They each died of peritonitis in 10 days.

Two more guinea-pigs, Nos. 3613 and 3614, were subsequently inoculated with the sputum. The former died in 11 days and showed no macroscopic tuberculous lesions and no apparent cause of death; the latter was killed after 18 days and showed very slight general tuberculosis.

(*b*) With culture.

Rabbits.—A series of four rabbits was inoculated with culture derived from the original material through Guinea-pig 3614, two intravenously (doses 0·1 and 0·01 mg.) and two subcutaneously (doses 100·0 and 10·0 mg.).

They were all killed after 107 days. The intravenous rabbits showed slight generalised retrogressive tuberculosis, and the subcutaneous rabbits each showed a local lesion and slight retrogressive tuberculosis of the lungs.

Guinea-pigs.—Two guinea-pigs were inoculated with the culture derived from Guinea-pig 3614, one intraperitoneally and one subcutaneously, each receiving 0·1 mg.

They died of general tuberculosis in 23 and 49 days respectively.

Parrot.—Parrot 17 was fed with two serum cultures on each of two successive days; the cultures were derived from Guinea-pig 3614.

It was killed after 270 days and showed one miliary tubercle in the lung and no tuberculosis elsewhere.

SUMMARY.

From the sputum of a man aged 29, suffering from pulmonary tuberculosis, a culture was obtained which grows luxuriantly on artificial media, is virulent for the guinea-pig and slightly virulent for the rabbit.

VIRUS H. 145. "G.W."

TUBERCULOSIS OF THE LUNG.

Original material—Sputum.

HISTORY OF PATIENT.

The patient was a man aged 21 years admitted to hospital on November 23, 1908.

There was no family history.

The patient had had a cough for two years, and had slight haemoptysis one year before admission. Streaks of blood had been seen in the sputum from time to time, and tubercle bacilli were found in it one month before admission. The patient had occasionally complained of pain in the left side of the chest.

On admission to hospital the patient presented signs of consolidation of the upper lobe of the right lung with infiltration below, and of a cavity in the upper lobe of the left lung with consolidation lower down. Subsequently signs of a cavity were elicited at the right apex posteriorly. The temperature was normal.

The patient's condition improved and he gained in weight; he was discharged on February 22, 1909.

Sputum was collected for examination on February 19, 1909.

Use made of Sputum.

The sputum was inoculated into guinea-pigs and examined microscopically; in the smear preparation a moderate number of tubercle bacilli mostly uniformly stained and not very long, with only a few beaded forms, were seen.

CULTURES.

A culture was obtained from one of the sternal glands of guinea-pig 3540, which was inoculated with the sputum.

Subcultures on serum were good and pigmented. On agar a creamy wrinkled and warty layer was produced. On potato growth was creamy wrinkled and warty and of moderate thickness.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Guinea-pigs.—Two guinea-pigs, Nos. 3540 and 3541, were inoculated intraperitoneally with the sputum. No. 3541 died in 8 days of peritonitis; No. 3540 was killed after 18 days and showed very slight early general tuberculosis.

(*b*) With culture.

Rabbits.—A series of four rabbits was inoculated with culture derived from the original material through guinea-pig 3540, two intravenously (doses 0·1 and 0·01 mg.) and two subcutaneously (doses 30·0 and 10·0 mg.).

One intravenous rabbit died in 92 days the other was killed after 127 days; both showed slight generalised retrogressive tuberculosis; the cause of the death of the former was not apparent.

The subcutaneous rabbits were killed after 127 days; one showed a local lesion and slight retrogressive tuberculosis of the lungs and one kidney, the other a local lesion and one nodule in the lungs only.

Guinea-pigs.—Two guinea-pigs were inoculated each with 0·1 mg. of the culture derived from guinea-pig 3540, one intraperitoneally the other subcutaneously.

They died of general tuberculosis in 16 and 37 days respectively.

Parrots.—One parrot was fed on each of two successive days with the growth from two serum tubes of the culture derived from guinea-pig 3540.

It was killed after 270 days and showed no sign of tuberculosis.

SUMMARY.

From the sputum of a man aged 21, suffering from pulmonary tuberculosis, a culture was obtained which grows luxuriantly on artificial media, is virulent for the guinea-pig and slightly virulent for the rabbit.

H. 146. "N.F."

Original material—Sputum and Milk.

HISTORY OF PATIENT.

The patient was a married woman aged 33. She had suffered from ill-health for some time, the disease having been diagnosed three years previously as phthisis, and she had been under hospital treatment at various times since then. The last child was born on June 27, 1909 (13 days before the milk was collected for examination); the woman had had five children previously; two of these had been breast fed and one of them was stated to have died of "consumptive bowels."

Sputum and milk were collected for examination on July 10, 1909, and again on July 29, 1909.

Experiments made with the Sputum and Milk.

Sputum of July 10.—The sputum was mucoid with yellow muco-purulent particles; smear preparations made from it showed very numerous organisms stained blue, but no tubercle bacilli.

The centrifuged deposit of 10·0 cc. of the sputum was treated for 20 minutes with 5 per cent. antiformin, and three guinea-pigs were inoculated intraperitoneally each receiving one-third of the deposit. The guinea-pigs were killed 49 days later and found healthy. No tubercle bacilli were seen in a smear preparation made from the deposit.

Sputum of July 29.—The sputum was muco-purulent; a smear preparation made from it showed no tubercle bacilli. Two guinea-pigs were inoculated intraperitoneally each with a small quantity; one died in 12 days of peritonitis, the other was killed after 32 days and found healthy.

Milk of July 10.—There were 35·0 cc. of the milk; 5·0 cc. were centrifuged and the deposit examined microscopically; no tubercle bacilli were seen in the smear preparation. The rest of the milk was inoculated into six guinea-pigs intraperitoneally, each receiving 5·0 cc. They were all killed after periods varying from 38 to 45 days, and were found healthy.

Milk of July 29.—Four cubic centimetres of milk were received. In a smear preparation made from the milk no tubercle bacilli were seen. Two guinea-pigs were inoculated intraperitoneally each with 2·0 cc. of the milk; one died in five days of an acute infection, the other was killed after 32 days and found healthy.

SUMMARY.

The sputum and milk of a lactating woman aged 33, said to be suffering from pulmonary tuberculosis did not produce tuberculosis in guinea-pigs.

VIRUS H. 147. "P.C."

TUBERCULOSIS OF THE LUNG.

Original material—Sputum and Milk.

HISTORY OF PATIENT.

The patient was a married woman aged 39, who exhibited clinical signs of pulmonary phthisis. She was confined 26 days before her milk was first collected for examination; she had had seven children previously, four of whom were dead. The cause of death in these cases could not be verified, but the mother stated that the children were "weakly." The child that was born on July 11, 1909, subsequently died of "consumption of the bowels."

Sputum was collected for examination on August 6, 1909. Milk was collected for examination on August 6, and September 20, 21 and 22, 1909.

Use made of Sputum.

The sputum was mucoid; it was inoculated into guinea-pigs and examined microscopically; in the smear preparation no tubercle bacilli were seen.

Use made of Milk.

The quantities of milk received on the four occasions were respectively 14·0 cc., 18·0 cc., 10·0 cc., and 101·0 cc. From four to eight guinea-pigs were inoculated on each occasion.

The first specimen of milk was examined microscopically; no tubercle bacilli were seen in the smear preparation. The other specimens were not so examined.

CULTURES.

A culture was obtained from one of the guinea-pigs (No. 3832) inoculated with the sputum.

It produced pigmented growths on serum and a thick yellow wrinkled layer on glycerin serum. On glycerin agar a continuous highly wrinkled creamy-white layer was quickly formed. On glycerinated potato growth was luxuriant, yellow and wrinkled.

The surface of a bottle of broth became covered in three weeks with a membrane which was partly opaque and creamy-white, and partly grey and translucent.

INOCULATION EXPERIMENTS.

(*a*) With the original material.

Sputum.—Two guinea-pigs, Nos. 3832 and 3833, were inoculated intraperitoneally; they were killed after 37 days, and each showed early general tuberculosis.

Milk. (i).—Four guinea-pigs were inoculated intraperitoneally each with from 2·0 to 4·0 cc. They were killed, two after 38 and two after 59 days, and found healthy.

(ii).—Four guinea-pigs were inoculated intraperitoneally each with 4·5 cc. They were killed after 73 days and found healthy.

(iii).—Four guinea-pigs were inoculated intraperitoneally each with 2·5 cc. One died in ten days, the cause of death not being apparent; the others were killed after 76 days and found healthy.

(iv).—Eight guinea-pigs were inoculated intraperitoneally each with 5·0 cc. They were killed after 76 days and found healthy.

(*b*) With culture.

Rabbits.—A series of three rabbits was inoculated subcutaneously each with 10·0 mg. of culture derived from the original material through Guinea-pig 3832.

They were killed after 103 days and each showed slight retrogressive generalised tuberculosis.

Guinea-pigs.—A series of ten guinea-pigs was inoculated subcutaneously each with 1·0 mg. of the culture.

They all died of general tuberculosis in from 46 to 151 days.

SUMMARY.

From the sputum of a lactating woman aged 39, a culture was isolated which grows luxuriantly on artificial media, is virulent for the guinea-pig and slightly virulent for the rabbit. Her milk did not produce tuberculosis in guinea-pigs.

H. 148. "P.B."

Original material—Sputum and Milk.

HISTORY OF PATIENT.

The patient was a married woman, aged 26; she had suffered from "consumption" for an uncertain period, and in August, 1909, exhibited undoubted clinical signs of pulmonary tuberculosis. She was confined on March 8, 1909 (five months before her milk was collected for examination). She had had four children previously, three of whom died young of "convulsions." The baby born on March 8 is still alive, but since then the woman has had another child (on May 5, 1910), which died on September 5 of the same year, the cause of death being certified as "consumption."

Sputum and milk (from the left breast only) were collected for examination on August 11, 1909.

Experiments made with the Sputum and Milk.

Sputum.—A smear preparation of the sputum showed no tubercle bacilli. Two guinea-pigs were inoculated intraperitoneally each with a small dose of the sputum They were killed after 53 days and found healthy.

Milk.—A smear preparation made from the milk showed no tubercle bacilli. Four guinea-pigs were inoculated intraperitoneally with the milk, three receiving 5·0 cc. and one 2·5 cc. (17·5 cc. of milk in all had been received). They were killed after 54 days and found healthy.

SUMMARY.

The sputum and milk of a lactating woman aged 26, said to be suffering from pulmonary tuberculosis, did not produce tuberculosis in guinea-pigs.

H. 149. "N.C."

Original material—Sputum and Milk.

HISTORY OF PATIENT.

The patient was a married woman aged 36, who had suffered for some years from "consumption," and (in 1909) showed physical signs of pulmonary tuberculosis. Her last child was born shortly before her milk was collected for examination. She had had ten children previously, five of whom were dead, the cause of death in each case being uncertain.

Sputum and milk (28·0 cc. from the right breast) were collected for examination on August 18, 1909.

Experiments made with the Sputum and Milk.

Sputum.—Numerous micro-organisms were seen in a smear preparation made from the sputum. There was a moderate number of acid-fast bacilli resembling the acid-fast bacilli found in cow's milk; they were short, pointed, and often showed a central unstained line. They occurred usually among other organisms precisely like them in morphology but stained blue. No tubercle bacilli were seen.

The sputum was inoculated intraperitoneally into two guinea-pigs. One died in three days of an acute infection; the other was killed after 50 days and found healthy.

Milk.—No tubercle bacilli were seen in a smear preparation made from the milk.

Four guinea-pigs were inoculated intraperitoneally with the milk, two receiving 10·0 cc. and two 4·0 cc. One died in five days, the cause of death not being apparent; the others were killed after 71 days and found healthy.

SUMMARY.

The sputum and milk of a lactating woman aged 36, said to be suffering from pulmonary tuberculosis, did not produce tuberculosis in guinea-pigs.

VIRUS H. 150. "C.K."

TUBERCULOSIS OF THE LUNG.

Original material—Sputum.

HISTORY OF PATIENT.

The patient was a man aged 22 years admitted to hospital on January 22, 1909.

One cousin was said to have died of "consumption"; there was no further history of tuberculosis in the family.

The patient had an attack of pleurisy on the right side in August, 1908.

On admission he was found to have pneumo-thorax on the right side. The pneumo-thorax disappeared, but reappeared after an attack of coughing; subsequently there were signs of fluid at the right base, and the patient grew worse and died.

Sputum was collected for examination on February 11, 1909.

Use made of Sputum.

The sputum was inoculated into two guinea-pigs and into a rabbit (No. 2165) intraperitoneally.

Microscopical examination of a smear preparation from the sputum showed a moderate number of tubercle bacilli, long curved and beaded.

The two guinea-pigs died of acute infections in six and nine days; the rabbit was killed after 103 days and showed slight tuberculosis.

No cultures were obtained.

SUMMARY.

The sputum of a man aged 22 years caused acute infections in two guinea-pigs inoculated intraperitoneally and so no cultures were obtained. It produced in a rabbit inoculated intraperitoneally slight retrogressive tuberculosis. The bacillus from this case therefore resembled a human tubercle bacillus (Group II) in its virulence for the rabbit.

TABULAR SUMMARIES OF INOCULATION EXPERIMENTS.

I.—INOCULATION EXPERIMENTS ON CALVES.

CALVES INOCULATED WITH EMULSIONS OF HUMAN TISSUES.

SUBCUTANEOUS INOCULATIONS.

Virus.	Source of Tissue Emulsion.	Estimated Dose of T.B. Inoculated.	Number of Calf.	Age at Inoculation.	Duration of Life.	Result.
H. 80. "D.M." (*Tuberculosis of lung.*)	Human lung	195,000,000 T.B.	1131	About 5 months	Killed 366 days	Local tuberculosis and one tubercle in the lung. There was a tumour the size of a goose's egg at the seat of inoculation; on section it was composed of a thick fibrous margin and a gritty caseous centre. There was a nodular mass of similar character in the left prescapular gland. One pinhead-sized grey tubercle was seen in the lung.
	"	"	1141	About 5 months	Killed 93 days	Local tuberculosis and one or two disseminated lesions. The tumour at the seat of inoculation was composed of fibrous tissue containing a cavity filled with caseo-pus, which communicated externally through a small opening in the skin; the fibrous tissue contained some caseo-calcareous nodules and foci. The adjacent prescapular gland was enlarged and showed the greater part of its substance replaced by four masses composed of fibro-caseo-calcareous tissue surrounding some caseo-pus. One cervical gland was much enlarged and composed of caseo-calcareous substance in a white fibrous capsule. One mesenteric and one ileo-colic gland contained one or two calcareous foci.
H. 81. "P.W." (*Tuberculosis of lung.*)	Human lung	3,035,000,000 T.B.	1129	About 5½ months	Killed 108 days	Local tuberculosis. The local lesion consisted of thickened skin and a flat patch of fibrous tissue containing caseous and softened or fibro-calcareous nodules. The adjacent prescapular gland was enlarged and showed at either end a fibro-calcareo-caseous mass; about half the gland was replaced by tuberculous tissue. Close by there was a smaller gland composed partly of caseo-purulent material and partly of fibro-calcareo-caseous tissue; the capsule was much thickened. There was no tuberculosis elsewhere.
	"	"	1145	About 5½ months	Killed 100 days	Slight retrogressive general tuberculosis. There was a large elongated tumour at the seat of inoculation composed of dense fibrous tissue containing nodules (up to 1·5 cm. in diameter) with fibrous margins and purulent contents. There were a few similar nodules in the muscles between the tumour and the left prescapular gland; and in the subcutaneous tissues beyond the inferior extremity of the tumour there were numerous nodules with fibrous walls and calcareous or purulent and gritty centres. The left prescapular gland was much enlarged and was a loculated cyst filled with pus and breaking-down caseo-calcareous masses; the walls of the cyst were partly formed by glandular tissue beset with calcareous tubercles. The left prepectoral and cervical glands contained caseo-calcareous tubercles or were caseo-calcareous throughout. The lungs contained sparsely scattered small calcareous tubercles; the liver showed scattered tubercles and nodules up to a pea in size, the larger fibrous without central caseation, the smaller mostly with calcareous centres; the spleen contained fifteen calcareous tubercles and a pea-sized fibrous nodule with yellow points in the centre; one suprarenal body contained a minute tubercle; three calcareous tubercles were found in the small intestine. The thoracic glands contained patches and nodules of mortary caseo-calcareous substance. Nearly all the remaining lymphatic glands were affected, and contained one or many tubercles or nodules, the majority caseo-calcareous, some caseous and softened.

CALVES INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN.

VIRULENT VIRUSES.

SUBCUTANEOUS INOCULATIONS.

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Number of Calf.	Weight in Kilos.		Duration of Life.	Result.
					Initial.	Final.		
H. 69. “F.K.” *(Primary abdominal tuberculosis.)*	Human mesenteric glands through G.P. 1962.	64 days	50·0 mg.	1249	61·67	80·28	Killed 101 days (Well).	General progressive tuberculosis of moderate severity.
	Human meninges through G.P. 1924.	153 days	50·0 mg.	1267	71·21	53·52	Killed 56 days (Dying).	General tuberculosis, severe.
H. 77. “R.L.” *(Primary abdominal tuberculosis.)*	Human mesenteric gland.	361 days	50·0 mg.	1349	32·20	30·38	Died 19 days	General tuberculosis, severe.
H. 88. “E.L.” *(Primary abdominal tuberculosis.)*	Human mesenteric gland.	86 days	50·0 mg.	1271	78·01	57·60	Died 45 days	General tuberculosis, severe.
H. 89. “W.I.” *(Primary abdominal tuberculosis.)*	Human lung through G.P. 2474.	123 days	50·0 mg.	1275	93·85	117·46	Killed 105 days (Well).	General tuberculosis of moderate severity.
	”	208 days	50·0 mg.	1351	46·25	39·46	Killed 44 days (Dying).	General tuberculosis, severe.
H. 127. “R.R.” *(a)* *(Tuberculosis of the lung.)*	Human sputum through G.P. 3474.	89 days	50·0 mg.	1585	64·40	57·15	Killed 48 days (Very ill).	General tuberculosis.
	Human sputum through G.P. 3475.	120 days	50 0 mg.	1569	57·60	103·85	Killed 105 days (Well).	Slight general tuberculosis, apparently retrogressive. There was an ulcerated fibro-calcareous tumour at the seat of inoculation, and the adjacent glands were fibro-caseo calcareous or contained discrete tubercles. The lungs showed a moderate number of tubercles up to 2 mm., the smaller grey the larger caseous and calcareous, and also a few consolidated lobules which were fibro-calcareous. The spleen contained a moderate number of miliary caseo-calcareous tubercles, the liver scattered calcareous tubercles. The thoracic and abdominal glands contained scattered calcareous tubercles or calcareous patches, the peripheral glands caseous gritty miliary tubercles. The udder appeared normal; in the milk sinuses there was pus which contained tubercle bacilli.
” ” *(c)*	Human sputum direct.	115 days	50·0 mg.	1593	55·33	53·06	Killed 34 days (When very ill).	General miliary tuberculosis.
			50·0 mg.	1595	60·32	54·87	Killed 45 days (When dying).	General tuberculosis.
H. 128. “D.D.” *(a)* *(Tuberculosis of the lung.)*	Human sputum through G.P. 3584.	77 days	50·0 mg.	1579	90·70	69·84	Killed 41 days (Dying).	General tuberculosis, severe.

CALVES INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN—*continued.*

VIRULENT VIRUSES—*continued.*

SUBCUTANEOUS INOCULATIONS.—*continued.*

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Number of Calf.	Weight in Kilos.		Duration of Life.	Result.
					Initial.	Final.		
H. 128. “D.D.” (*a*) (*Tuberculosis of the lung.*)	Human sputum through G.P. 3584.	77 days	45·0 mg.	1567	48·50	48·05	Killed 42 days (Very ill).	General tuberculosis, severe.
,, (*b*)	Human sputum direct.	85 days	50·0 mg.	1587	52·61	43·08	Died 46 days	General tuberculosis.
			50·0 mg.	1589	55·33	46·25	Killed 37 days (When dying).	General tuberculosis.
SLIGHTLY VIRULENT VIRUSES.								
H. 67. “E.P.” (*Multiple tuberculosis of bones.*)	Pus from scapular abscess through G.P. 1914.	108 days	50·0 mg.	1169	95·20	142·87	Killed 90 days	Slight generalised tuberculosis. There was a fibrous-walled cyst with caseo-purulent contents at the seat of inoculation, and the adjacent prescapular gland was caseo-necrotic almost throughout. A very few small tubercles were seen on the surface of the lungs, and most of the lymphatic glands of the body contained one or more small tubercles. Other organs and glands were normal.
	,,	,,	50·0 mg.	1173	80·73	163·29	Killed 137 days	Local tuberculosis The local lesion was a fibrous tumour with a central cavity containing caseo-pus and turbid fluid. A small caseous nodule and calcareous tubercles and foci were found in the left prescapular gland. There was no tuberculosis elsewhere.
H. 68. “R.B.” (*Tuberculosis of the sacrum.*)	Pus from sacral abscess.	190 days	100·0 mg.	1161	79·82	126·96	Killed 91 days	Slight generalised tuberculosis. There was a small firm tumour at the seat of inoculation, composed of caseous substance in a dense fibrous wall, and the adjacent prescapular gland contained two firm caseous nodules (1 cm. in diameter). A pre-pectoral gland was partly caseated, partly fibroid. There were a few grey tubercles in the lungs, calcareous tubercles in the mesenteric and ileo-colic glands, and minute yellow foci in the thoracic glands.
	,,	,,	50·0 mg.	1167	91·15	133 75	Killed 92 days	Local tuberculosis with a few disseminated lesions. There was a fibrous-walled cyst at the seat of inoculation, containing partly softened caseous substance, and a small fibro-caseo-calcareous mass was found in the underlying muscles. The left prescapular gland contained two large caseous softening patches, slightly gritty. One or two minute tubercles were found in the lung, in one suprarenal body and in two thoracic and one lumbar glands.
H. 72. “H.C.” (*Tuberculosis of a rib.*)	Pus from abscess of rib through G.P. 1915.	82 days	100·0 mg.	1165	74·38	115·64	Killed 98 days	Local tuberculosis. At the seat of inoculation there was a collapsed and ulcerated abscess, and the adjacent prescapular gland was largely composed of two fibro-calcareo-caseous masses; the larger showed several small cavities filled with caseo-pus. There was no tuberculosis elsewhere.

H. 74. "D.S." *(Primary abdominal tuberculosis.)*	Human mesenteric gland.	120 days	50·0 mg.	1181	83·91	121·54	Killed 118 days	Local tuberculosis. At the seat of inoculation there was a small fibroid patch infiltrated with calcareous foci and surmounted by thickened skin, and there were a few calcareous nodules and tubercles in a normal-sized prescapular gland. There was no tuberculosis elsewhere.
	Human lung through G.P. 2004.	90 days	50·0 mg.	1183	81·18	126·07	Killed 118 days	Local tuberculosis. There was a small fibrous-walled cyst with caseo-purulent contents at the seat of inoculation, and the adjacent prescapular gland contained two small calcareous nodules and a few calcareous grains. Soft glassy foci were seen in the lungs, of doubtful origin; no T.B. could be found in them.
H. 75. "A.H." *(Primary abdominal tuberculosis.)*	Human peritoneal fluid through G.P. 2018.	99 days	50·0 mg.	1195	66·65	91·15	Killed 97 days	Local tuberculosis. At the seat of inoculation there was a fibrous-walled cyst the size of a goose's egg containing tenacious caseo-pus; the adjacent prescapular gland contained three fibro-calcareo-caseous nodules. There was no tuberculosis elsewhere.
H. 78. "O.D." *(General tuberculosis probably primary in cervical glands.)*	Human bronchial gland.	98 days	50·0 mg.	1185	71·66	100·67	Killed 127 days	Local tuberculosis. The tumour was composed of thickened skin and of breaking-down caseous substance within a fibrous capsule. In the adjacent prescapular gland there were two dense caseous masses, and small calcareous tubercles and patches. One left cervical gland contained a caseo-calcareous mass, another two calcareous tubercles. One doubtful tubercle was found in the lung.
	Human meninges through G.P. 2122.	77 days	50·0 mg.	1179	73·92	116·95	Killed 127 days	Local tuberculosis with a few disseminated lesions. The tumour was composed of dense fibrous tissue surrounding a cavity filled with caseo-pus. The left prescapular gland contained three small fibro-calcareous patches; there were a few minute calcareous tubercles in the thoracic glands. One mesenteric gland contained a single calcareous grain.
H. 79. "J.N." *(Tuberculosis of lung.)*	Human lung	85 days	50·0 mg.	1205	61·22	131·07	Killed 138 days	Local tuberculosis and three minute foci in the lungs. At the seat of inoculation there was a patch of thickened skin with a depressed scar, covering a thin mass of fibroid tissue containing a few calcareous grains. The adjacent prescapular gland was partly fibro-calcareous, partly caseous. In the lungs three or four minute translucent foci were seen, one with an opaque centre.
H. 80. "D.M." *(Tuberculosis of lung.)*	Human lung	81 days	50·0 mg.	1209	—	108·40	Killed 126 days	Local tuberculosis. There was a firm fibro-calcareous tumour at the seat of inoculation. About half the left prescapular gland was occupied by two dense gritty caseous masses; one left prepectoral gland contained a small calcareous nodule. There was no tuberculosis elsewhere.
H. 81. "P.W." *(Tuberculosis of lung.)*	Human lung	72 days	50·0 mg.	1211	—	89·79	Killed 124 days	Local tuberculosis and three small tubercles in the lungs. At the seat of inoculation there was a tense cyst with thick caseo-purulent contents. The left prescapular gland contained calcareous grains and two small calcareous nodules; one left prepectoral gland was fibro-calcareo-caseous throughout. In the lungs three small grey translucent tubercles were found.
H. 87. "W.D." *(Tuberculosis of the suprarenal bodies.)*	Human suprarenal body through a guinea-pig.	56 days	50·0 mg.	1253	58·05	105·67	Killed 102 days	Local tuberculosis with a few disseminated lesions. There was a small cyst at the seat of inoculation. In the left prescapular gland there were two small fibro-calcareous nodules. There were scattered calcareous tubercles in the ileo-colic glands; a mesenteric gland contained one.

CALVES INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN—*continued.*

SLIGHTLY VIRULENT VIRUSES—*continued.*

SUBCUTANEOUS INOCULATIONS—*continued.*

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Number of Calf.	Weight in Kilos.		Duration of Life.	Result.
					Initial.	Final.		
H. 104. "E.R." (*Tuberculosis of the lungs with calcareous mesenteric glands.*)	Human lung	51 days	50·0 mg.	**1393**	67·10	101·6	Killed 117 days	Local tuberculosis with a few disseminated lesions. There was a large cyst at the seat of inoculation filled with caseo-pus and firm caseous masses. The left prescapular gland was three-quarters caseous and calcareous; one prepectoral gland was caseous throughout. In the lungs a few small grey tubercles were seen. Most of the peripheral lymphatic glands contained scattered caseous gritty tubercles; the mesenteric glands contained some scattered calcareous foci.
H. 133. "P.K." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3449.	58 days	50·0 mg.	**1575**	51·70	102·95	Killed 101 days	Local tuberculosis and one disseminated lesion. At the seat of inoculation there was a fibrous-walled cyst of moderate size containing caseous masses and caseo-pus. The adjacent prescapular gland was enlarged and about half its substance was replaced by caseous masses or fibro-calcareous patches. One prepectoral gland was fibro-caseous, another contained a few calcareous foci. There was a calcareous tubercle in one ileo-colic gland.
		"	50·0 mg.	**1581**	58·50	109·30	Killed 101 days	Local tuberculosis and one or two disseminated lesions. The local lesion was a thin-walled cyst the size of a Jaffa orange filled with caseous masses and watery fluid. The left prescapular gland contained three fibroid nodules one with a caseous centre. Five calcareous foci were seen in the mesenteric glands.
H. 124. "M.M." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3452.	160 days	200·0 mg.	**1603**	90·71	121·54	Killed 93 days	Very slight retrogressive generalised tuberculosis. There was a small fibro-calcareous local lesion, and the adjacent prescapular gland was caseous and softening almost throughout. The lungs contained scattered miliary caseo-calcareous tubercles and some minute grey foci and showed one lobule fibro-calcareous. A few soft yellow foci (containing T.B.) were seen in Peyer's patches. Scattered caseo-calcareous foci were seen in many of the abdominal lymphatic glands. One fibrous tubercle was seen in the liver.
H. 129. "T.M." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3479.	185 days	45·0 mg.	**1597**	52·16	91·62	Killed 92 days	Local tuberculosis and a few disseminated lesions. There was a small fibro-caseous local lesion, and the adjacent gland was extensively occupied by fibro-caseous nodules. The mesenteric and ileo-colic glands contained caseo-calcareous foci and the lungs two minute tubercles with calcareous centres.
H. 143. "L.L." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3536.	176 days	68·0 mg.	**1601**	69·84	104·31	Killed 91 days	Local tuberculosis and a few disseminated lesions. There was a tense cyst at the seat of inoculation containing thin pus and caseo-necrotic masses. The adjacent prescapular gland contained a large fibro-caseous mass; a prepectoral gland was fibro-caseous throughout; a cervical gland contained a caseo-calcareous nodule. Half-a-dozen minute tubercles were seen in the lungs, and there were seven or eight miliary caseous tubercles in each suprarenal body. A moderate number of caseo-calcareous foci were seen in the ileo-colic glands.

MIXED VIRUSES.

SUBCUTANEOUS INOCULATIONS.

H. 60. "W.B." (*General miliary tuberculosis of uncertain origin.*)	Human bronchial gland through G.P. 1825.	72 days	50·0 mg.	1099	48·05	40·36	Killed 28 days (when dying).	General tuberculosis.
	"	121 days	10·0 mg.	1107	47·60	43·08	Died 58 days	General tuberculosis.
	"	"	10·0 mg.	1109	55·33	48·95	Died 32 days	General tuberculosis.
	Human mesenteric gland through G.P. 1829.	41 days	50·0 mg.	1049	50·80	73·02	Killed 94 days	Local tuberculosis. There was a small patch of dense fibrous tissue containing calcareous grains at the seat of inoculation, and in the skin over it there was a scar. The adjacent prescapular gland was slightly enlarged, and at one end showed scattered calcareous grains. There was no tuberculosis elsewhere.
	Human mesenteric gland through G.P. 1830.	32 days	650·0 mg.	1053	51·25	68·90	Killed 95 days	Local tuberculosis with a few disseminated lesions. There was a large pendulous cyst containing curdy fluid at the seat of inoculation; the right prescapular gland contained fibro-calcareous nodules. A fibrous nodule with a caseous centre and several minute translucent tubercles were seen in the lung. Several mesenteric, the right ischiatic, and both popliteal glands each contained one or two small caseous tubercles.
	Human lung through G.P. 1827.	60 days	50·0 mg.	1081	79·37	91·60	Killed 90 days	Slight generalised tuberculosis. There was a fibrous-walled cyst containing softened caseous matter at the seat of inoculation. The adjacent prescapular gland was enlarged and almost entirely calcareous. In the lungs there were a few irregular grey tubercles with yellow centres and a fibro-calcareous nodule measuring 2 by 0·7 cm. There were two rather large tubercles in the spleen, and ten small yellowish tubercles in the liver. One minute tubercle was found in one bronchial gland, and in each of two portal, one lumbar, one iliac, and one precrural glands.
	Human meninges through G.P. 1832.	36 days	50·0 mg.	989	83·45	112·02	Killed 91 days	Local tuberculosis with a few disseminated lesions. There was a fibro-calcareous tumour at the seat of inoculation part of which had broken down into caseo-purulent fluid. The right prescapular gland was largely occupied by fibro-calcareous nodules. A small hard fibro-calcareous nodule, a calcareous grain, and two minute grey tubercles were seen in the lungs.
	"	"	50·0 mg.	995	83·45	120·62	Killed 92 days	Local tuberculosis with a few disseminated lesions. At the seat of inoculation there was a depressed scar situated in thickened skin over a small fibrous-walled cavity containing softened caseous matter. The adjacent prescapular gland contained two fibro-calcareous nodules. A few minute calcareous specks were seen in the thoracic and mesenteric glands.
H. 90. "I.P." (*Primary abdominal tuberculosis.*)	Human retroperitoneal gland.	340 days	50·0 mg.	1383	73·47	84·35	Killed 92 days	General tuberculosis, progressive, but not severe. There was an abscess containing caseous masses and ill-formed pus at the seat of inoculation, and the adjacent glands were enlarged and mainly composed of dense caseous gritty substance. The lungs contained fairly numerous small fibro-caseous shotty nodules and a few larger nodules up to 1·5 cm. in diameter; on the surface there were two reddish "perlsucht" growths and a few others in an early stage of formation. The spleen contained a moderate number of fibro-caseous gritty nodules, the kidneys one each; scattered fibro-caseo-calcareous nodules were seen in the liver. The thoracic and several abdominal glands contained calcareous or caseo-calcareous tubercles, in some cases confluent; two peripheral glands contained each a caseous nodule.

CALVES INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN—*continued.*

MIXED VIRUSES—*continued.*

SUBCUTANEOUS INOCULATIONS—*continued.*

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Number of Calf.	Weight in Kilos.		Duration of Life.	Result.
					Initial.	Final.		
H. 90. "I.P."—*continued.*	Human retroperitoneal gland.	340 days	80·0 mg.	**1471**	131·98	134·26	Killed 90 days	Local tuberculosis and slight progressive tuberculosis of lungs and spleen. There was a small ulcerated tumour at the seat of inoculation, and the adjacent glands contained discrete caseo-purulent nodules. The lungs contained sparsely scattered irregular reddish nodules (up to 3 mm.) showing opaque points internally; on the surface there were four reddish "perlsucht" growths (the largest 8 mm. in diameter), and two or three in an early stage growing from nodules in the parenchyma. The spleen contained a dozen grey tubercles with yellow gritty centres. In the thoracic glands scattered calcareous tubercles and opaque foci were seen. Other organs and glands were normal.

SLIGHTLY VIRULENT VIRUS.

INTRAVENOUS INOCULATION.

H. 104. "E.R." (*Tuberculosis of the lungs with calcareous mesenteric glands.*)	Human lung	51 days	5·0 mg.	**1385**	49·89	40·82	Died 29 days	Acute tuberculosis. Nearly the whole of the left lung and of the anterior lobes of the right lung were dark red and airless; in the posterior lobe of the right lung the dark red areas were somewhat less extensive. The whole lung was closely packed with very minute greyish-white tubercles; the right middle lobe was mottled with yellow necrotic areas, and several lobules in the left caudal lobe were firm and necrotic. The thoracic glands were enlarged and in an early stage of caseation. In the right side of the heart fairly numerous minute tubercles were seen, and there were a moderate number of minute whitish foci in the liver and right kidney. No tubercles were visible in the remaining organs and glands.

INOCULATION EXPERIMENTS ON RABBITS.

RABBITS INOCULATED WITH EMULSIONS OF HUMAN TISSUES.

Virus.	Source of Tissue Emulsion.	Microscopic Examination of Emulsion.	Mode of Inoculation.	Number of Rabbit.	Weight in Grammes.		Duration of Life.	Result.
					Initial.	Final.		
H. 70. "N.W." *(Primary abdominal tuberculosis.)*	Mesenteric gland	3 T.B. seen	Intrap.	910	1,790	2,970	Killed 135 days	In the muscle wall of the abdomen there was a cluster of caseous gritty tubercles. The omentum and visceral peritoneum showed a few translucent tubercles. In the lung one doubtful tubercle was seen (no T.B.). There was no disease elsewhere.
	Bronchial gland	—	Intrap. and Subcut.	911	1,620	2,550	Killed 135 days	In the muscle wall and subcutaneous tissues at the site of inoculation there were numerous small scattered caseous tubercles; a left pudic gland was caseous. A few tubercles were seen on the omentum and meso-colon. There was no tuberculosis elsewhere. No T.B. were seen in a smear from one of the subcutaneous nodules.
H. 74. "D.S." *(Primary abdominal tuberculosis.)*	Spleen	No T.B. seen	Intrap.	1012	1,590	3,300	Killed 94 days	The omentum showed about a dozen pinhead tubercles, and a few caseous tubercles (up to a millet-seed) were seen in the lungs.
	Mesenteric gland	4 T.B. seen	Intrap.	1013	1,690	2,950	Killed 94 days	There were a few small tubercles on the omentum (similar to 1012) and no tuberculosis elsewhere.
	Bronchial gland	1 T.B. seen	Intrap.	1014	1,700	2,850	Killed 94 days	There were about half a dozen minute tubercles in the omentum and no tuberculosis elsewhere.
H. 75. "A.H." *(Primary abdominal tuberculosis.)*	Peritoneal fluid	No T.B. seen	Intrap.	1015	1,200	1,610	Killed 78 days	There were a few caseous tubercles in the omentum and no sign of tuberculosis elsewhere. A smear made from one of the caseous tubercles showed T.B., very beaded.
	"	"	Intrap.	1016	1,450	2,910	Killed 78 days	No tuberculosis.
	Bronchial gland	No T.B. seen	Intrap.	1026	1,000	1,070	Died 4 days	An acute pneumococcal infection.
	"	"	Subcut.	1027	1,000	920	Died 2 days	An acute pneumococcal infection.
	Lung	Three T.B. seen	Intrap.	1028	1,170	1,150	Died 1 day	An acute infection.
H. 77. "R.L." *(Primary abdominal tuberculosis.)*	Mesenteric glands and nodules.	Fairly numerous T.B.	Intrap.	1041	1,160	950	Died 51 days	General tuberculosis.
	"	"	Subcut.	1042	1,300	1,410	Died 59 days	General tuberculosis.
	"	"	Intrap.	1043	1,150	900	Died 32 days	General tuberculosis.
H. 78. "O.D." *(General tuberculosis, probably primary in cervical glands.)*	Bronchial gland	Fairly numerous T.B.	Intrap.	1046	1,160	2,800	Killed 92 days	There were a few small tubercles on the omentum and peritoneum, and a pea-sized caseo-purulent nodule attached to the caecum (no T.B. seen). The right lung contained three grey tubercles with minute caseous centres.
	Spleen	No T.B. seen	Intrap.	1047	1,110	1,120	Died 1 day	An acute infection.

H. 79. "J.N." (*Tuberculosis of lung.*)	Suprarenal body	No T.B. seen	Intrap.	1068	940	2,150	Killed 108 days	No tuberculosis.
	Lung (E. of pea-sized caseous nodule).	Numerous T.B.	Intrap.	1069	1,050	2,870	Killed 108 days	Omentum and peritoneum normal. Each kidney contained a single tubercle slightly opaque in the centre. In the caudal lobe of the left lung a yellow gritty mass (1 cm.) was seen, and a similar caseous-looking nodule (4 mm.). In the right lung there were only two or three miliary tubercles. A left bronchial gland was enlarged and contained a large caseous patch. T.B. were numerous in a smear made from one of the caseous masses in the lung.
	Lung (E. of small caseous patch).	T.B.	Intrap.	1070	820	720	Died 3 days	An acute infection.
	Lung (E. of caseous patch).	T.B.	Subcut.	1085	3,120	3,020	Killed 103 days	There was a softened caseous tumour at the seat of inoculation and the axillary glands were enlarged and caseous. The right kidney contained three grey nodules, the left a single grey tubercle. The lungs (crepitant) contained sparsely scattered greyish nodules up to a pea in size, which showed caseous foci on section. T.B. were fairly numerous in a tubercle from the lung and in an emulsion of an axillary gland; none was seen in a nodule from the right kidney.
H. 80. "D.M." (*Tuberculosis of lung.*)	Lung	Estimated dose: 19,500,000 T.B.	Intrap.	1096	1,000	970	Died 4 days	Severe psorospermosis.
	"	"	Intrap.	1097	950	2,400	Killed 114 days	The omentum contained a dozen minute calcareous tubercles. Each kidney showed four or five small tubercles, the liver one. In the left caudal lobe of the lung two small tubercles were found. No T.B. were seen in the tubercle from the liver.
	"	"	Subcut.	1098	1,170	2,500	Killed 114 days	At the seat of inoculation there was a small cavity containing dry cheesy flakes of caseo-pus, and in the surrounding tissues a few small caseous nodules. The lungs contained two small caseous gritty nodules and half a dozen grey miliary tubercles.
	"	"	Subcut.	1099	1,120	2,700	Killed 114 days	There was a small cyst containing thin caseo-pus at the seat of inoculation; the axillary glands were slightly enlarged but showed no sign of caseation. The lungs contained sparsely-scattered small caseous nodules with grey margins.
H. 81. "P.W." (*Tuberculosis of lung.*)	Lung	Numerous T.B.	Intrap.	1122	1,800	1,250	Died 16 days	Purulent peritonitis.
	"	"	Subcut.	1123	2,800	2,170	Died 15 days	An acute infection.
	Lung	Estimated dose: 303,500,000 T.B.	Intrap.	1124	1,750	1,800	Died 20 days	Septic peritonitis; no sign of tuberculosis.
	"	Estimated dose: 75,875,000 T.B.	Intrap.	1125	1,500	1,350	Died 49 days	A subacute infection with no obvious signs of tuberculosis.
H. 82. "G.F." (*General tuberculosis, primary in the alimentary tract.*)	Mesenteric gland	No T.B. seen	Intrap.	1159	600	2,000	Killed 98 days	There were a few very minute transparent tubercles in the omentum and no sign of tuberculosis elsewhere.
	"	"	Intrap.	1160	600	440	Died 3 days	The cause of death was not apparent.
	Bronchial gland	Numerous T.B.	Intrap.	1161	520	2,100	Killed 98 days	No tuberculosis.
	Lung	Numerous T.B.	Intrap.	1162	550	650	Died 42 days	Pseudo-tuberculosis. No sign of tuberculosis.
H. 83. "G.C." (*General tuberculosis, primary in the alimentary tract.*)	Mesenteric gland	No T.B. seen	Intrap.	1188	1,000	2,260	Killed 96 days	The omentum contained a few very minute glassy tubercles. The lungs showed two greyish red tubercles without central caseation.
	Bronchial gland	T.B.	Intrap.	1189	720	2,200	Killed 96 days	No tuberculosis.

RABBITS INOCULATED WITH EMULSIONS OF HUMAN TISSUES—*continued.*

Virus.	Source of Tissue Emulsion.	Microscopic Examination of Emulsion.	Mode of Inoculation.	Number of Rabbit.	Weight in Grammes.		Duration of Life.	Result.
					Initial.	Final.		
H. 83. "G.C."—*continued.*	Spleen	No T.B. seen	Intrap.	1190	750	2,260	Killed 96 days	The omentum contained about 3 dozen caseous miliary tubercles, and there was one minute grey tubercle in the lung.
H. 86. "C.P." (*Tuberculosis primary in the lung.*)	Meninges	No T.B. seen	Subcut.	1275	800	650	Died 4 days	An acute infection.
	Lung	2 T.B. seen	Subcut.	1276	800	1,900	Killed 80 days	No tuberculosis
	Bronchial gland	1 T.B. seen	Subcut.	1277	850	1,750	Killed 80 days	No tuberculosis.
H. 87. "W.D." (*Tuberculosis of the suprarenal bodies.*)	E. of iliac gland of guinea-pig inoculated with a human suprarenal body.	Few T.B.	Subcut.	1278	700	1,350	Killed 90 days	At the seat of inoculation there was a small cyst filled with caseo-pus, and an aggregation of caseous tubercles. In the left caudal lobe of the lung a group of a dozen discrete grey miliary tubercles was seen.
	E. of inguinal gland of guinea-pig.	Few T.B.	Subcut.	1279	650	1,700	Killed 90 days	At the seat of inoculation there was a small flat patch composed of closely aggregated minute caseous tubercles; there was no tuberculosis elsewhere.
H. 88. "E.L." (*Primary abdominal tuberculosis.*)	Mesenteric gland	Few T.B.	Subcut.	1285	2,050	1,450	Died 77 days	General tuberculosis.
H. 89. "W.I." (*Primary abdominal tuberculosis.*)	Mesenteric gland	Very numerous T.B.	Subcut.	1333	1,200	1,020	Died 7 days	The cause of death was not apparent; the organs and glands appeared healthy.
	"	"	Subcut.	1334	1,350	1,200	Died 55 days	General tuberculosis.
	Lung	Very numerous T.B.	Subcut.	1335	1,450	1,350	Died 5 days	Death from pleural effusion.
H. 90. "I.P." (*Primary abdominal tuberculosis.*)	Mesenteric gland	Numerous T.B.	Subcut.	1408	1,200	1,800	Died 9 days	Pseudo-tuberculosis.
	"	"	Intrap.	1409	1,350	3,550	Killed 128 days	In the omentum there were two calcareous foci and a pea-sized grey nodule containing calcareous grains. The lungs (crepitant) contained scattered grey miliary tubercles with caseous centres, and one larger tubercle; the thin margins of an anterior lobe were solid and greyish-red. There was no tuberculosis elsewhere.
H 93. "C.D." (*General miliary tuberculosis.*)	Lung	Numerous T.B.	Subcut.	1509	1,700	3,270	Killed 184 days	At the seat of inoculation there was a small fibro-caseous softened nodule and a few caseous tubercles some gritty. There was no tuberculosis elsewhere.
H 104. "E.R." (*Tuberculosis of lungs with calcareous mesenteric glands.*)	Lung	Few T.B.	Subcut.	1724	2,830	3,000	Killed 111 days	There was a caseous local lesion the size of a thrush's egg; the lungs contained scattered irregular nodules with grey margins and caseous centres, and there were two small tubercles in one kidney. There was no tuberculosis elsewhere.
	Mesenteric glands	2 T.B. seen	Subcut.	1725	2,380	2,660	Killed 111 days	There was a small cyst with thick walls and containing watery fluid at the seat of inoculation. There were a few scattered grey tubercles with caseous centres in the lungs. Other organs and all the glands were normal.

RABBITS INOCULATED WITH HUMAN SPUTUM.

Virus.	Material used for Inoculation	Microscopic Examination of Sputum.	Mode of Inoculation.	Number of Rabbit.	Weight in Grammes.		Duration of Life.	Result.
					Initial.	Final.		
H. 120. "B.W." (*Tuberculosis of the lung.*)	Sputum	Numerous T.B.	Intrav.	2148	2,700	1,570	Died 86 days	Severe tuberculosis of lungs and slight tuberculosis of kidneys. The lungs were enlarged, heavy, solid, and from the surface appeared to be composed of yellowish caseous substance with small islands of reddish-grey tissue; on section the caseous substance penetrated pretty deeply, while in the central parts of the lung there were caseating nodules surrounded by a small amount of congested oedematous lung tissue. The bronchial glands were enlarged and congested and showed one or two caseous foci. There was a small caseous tubercle in each kidney.
H. 121. "E.A." (*Tuberculosis of the lung.*)	Sputum	Numerous T.B.	Intrav.	2149	1,100	1,600	Killed 144 days	Tuberculosis of lungs, kidneys, and eyes. The lungs were crepitant and contained a moderate number of miliary caseo-calcareous tubercles; in the margins there were confluent grey patches with caseous foci, and the posterior tips were caseo-calcareous. There was a grey tubercle or two on the surface of each kidney and one or two caseous streaks in the medulla. The cornea of each eye was opaque and vascularised and in the iris of one there were several calcareous tubercles. One lachrymal gland contained a caseous nodule.
			Intrav.	2150	2,300	1,650	Killed 144 days	Slight tuberculosis of lungs and a kidney and severe tuberculosis of one testicle. The lungs showed on the surface grey tubercles with opaque centres, and irregular grey tracts with caseous foci, and the thin anterior parts of the cephalic lobes were grey with caseous foci. One kidney showed a caseous tubercle and a caseous streak. One testicle was very large and extensively caseous.
H. 122. "F.P." (*Tuberculosis of the lung.*)	Sputum	Moderately numerous T.B.	Intrap.	2152	2,300	2,200	Killed 144 days	There were a few miliary caseous tubercles in the omentum and on the peritoneum. The dorsal surfaces of the lungs were covered with irregular superficial grey tracts containing caseous foci, and on the ventral surfaces were similar but less numerous areas; the lung substance contained sparsely scattered grey tubercles. There were three or four caseous miliary tubercles on the surface of each kidney.
H. 123. "W.W." (*Tuberculosis of the lung.*)	Sputum	Very numerous T.B.	Intrap.	2153	1,150	1,850	Killed 145 days	The omentum showed about half-a-dozen fibrous tubercles; in the lungs there were a few grey tubercles up to 2 mm. in diameter, two or three with caseo-calcareous centres; there was no tuberculosis elsewhere.
			Intrap.	2154	2,100	1,500	Died 27 days	The cause of death was not apparent. There were numerous submiliary caseous tubercles in the omentum, and no sign of disease elsewhere.
H. 124. "M.M." (*Tuberculosis of the lung.*)	Sputum	Moderately numerous T.B.	Intrap.	2155	1,250	930	Died 4 days	Septic peritonitis.
			Intrap.	2156	2,570	2,330	Killed 145 days	Slight general tuberculosis. There were a dozen calcareous miliary tubercles on the omentum and a few on the mesocolon. The lungs showed on the surface scattered caseo-calcareous nodules up to a hempseed in size, and a few irregular patches of confluent nodules. Each kidney contained one tubercle. Five of the mammary glands were slightly enlarged and contained caseo-pus.

RABBITS INOCULATED WITH HUMAN SPUTUM—*continued.*

Virus	Material used for Inoculation.	Microscopic Examination of Sputum.	Mode of Inoculation.	Number of Rabbit.	Weight in Grammes.		Duration of Life.	Result.
					Initial.	Final.		
H. 125. "A.P." (*Tuberculosis of the lung.*)	Sputum	Moderately numerous T.B.	Intrap.	2157	1,450	1,750	Killed 145 days	No tuberculosis.
			Intrap.	2158	2,000	2,650	Killed 145 days	The omentum contained two small caseo-calcareous nodules. The lungs contained a moderate number of miliary tubercles, many with caseous or calcareous centres; here and there on the dorsal surfaces of the caudal lobes they formed small patches. There was no tuberculosis elsewhere.
H. 127. "R.R." (*a*) (*Tuberculosis of the lung.*)	Sputum	Numerous T.B.	Intrap.	2159	900	750	Died 7 days	Peritonitis.
H. 127. "R.R." (*b*)	Sputum	Numerous T.B.	Intrav.	2340	2,950	2,000	Died 37 days	General tuberculosis.
			Intrav.	2342	1,100	800	Died 32 days	General tuberculosis.
			Subcut.	2341	2,900	2,400	Died 5 days	An acute infection.
			Subcut.	2343	1,000	850	Died 4 days	Cellulitis and an acute infection.
H. 127. "R.R." (*c*)	Sputum	A moderate number of T.B.	Intrav.	2366	1,550	1,550	Died 1 day	The cause of death was not apparent.
			Intrav.	2367	1,250	1,200	Died 4 days	An acute infection.
	Sputum treated for 3 hours with 15% antiformin.	”	Intrav.	2374*	1,400	2,400	Killed 116 days	No tuberculosis.
			Intrav. and Subcut.	2375*	1,400	2,650	Killed 116 days	No tuberculosis.
H. 127. "R.R." (*d*)	Sputum	Numerous T.B.	Intrav.	2368	1 200	1,100	Died 5 days	An acute infection.
			Intrav.	2369	1,400	1,140	Died 4 days	An acute infection.
	Centrifuged deposit of 2·0 cc. of sputum treated for 1 hour with 15% antiformin.	—	Intrav.	2376*	1,600	2,500	Killed 113 days	No tuberculosis.
		—	Intrav.	2377*	1,700	2,570	Killed 113 days	No tuberculosis.
H. 128. "D.D." (*a*) (*Tuberculosis of the lung.*)	Sputum	A moderate number of T.B.	Intrap.	2160	2,300	2,100	Died 2 days	Peritonitis.
H. 128. "D.D." (*b*)	Sputum	Numerous T.B.	Intrav.	2364	1,700	1,300	Died 38 days	General miliary tuberculosis.

			Intrav.	2365	1,500	950	Died 49 days	General tuberculosis.
H. 129. "T.M." (*Tuberculosis of the lung.*)	Sputum	Numerous T.B.	Intrap.	2161	790	750	Died 1 day	Peritonitis.
H. 130. "N.B." (*Tuberculosis of the lung.*)	Sputum	Very numerous T.B.	Intrap.	2162	2,870	2,600	Died 18 days	Peritonitis and a subacute infection.
H. 131. "M.H." (*Tuberculosis of the lung.*)	Sputum	A moderate number of T.B.	Intrap.	2163	2,870	2,570	Died 3 days	Peritonitis.
H. 132. "O.O." (*Tuberculosis of the lung.*)	Sputum	Numerous T.B	Intrap.	2164	1,170	1,080	Died 3 days	Peritonitis.
H. 134. "K.K." (*Tuberculosis of the lung.*)	Sputum	Numerous T.B.	Intrap.	2166	1,550	2,000	Killed 139 days	There were a few minute tubercles in the omentum, which was somewhat thickened, and one caseous tubercle in the lung.
H. 135. "E.E." (*Tuberculosis of the lung.*)	Sputum	Numerous T.B.	Intrap.	2167	2,370	1,700	Died 12 days	Peritonitis.
H. 150. "C.K." (*Tuberculosis of the lung.*)	Sputum	A moderate number of T.B.	Intrap.	2165	2,570	2,550	Killed 103 days	There were a few large caseous and softened nodules in the omentum. On the dorsal border of each lung there was a large caseating superficial patch, in the thin margins grey patches with caseous foci, and elsewhere single tubercles and groups of tubercles. There was a tubercle or two in each kidney. No tuberculosis elsewhere.

* The tubercle bacilli in the material inoculated were evidently dead.

RABBITS INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN.

VIRULENT VIRUSES.

INTRAVENOUS INOCULATIONS.

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Number of Rabbit.	Weight in Grammes.		* Duration of Life.	Result.
					Initial.	Final.		
H. 69. "F.K." (*Primary abdominal tuberculosis.*)	Human mesenteric gland through G.P. 1962.	64 days	1·0 mg.	1087	1,660	1,520	Died 17 days	General tuberculosis.
			0·1 mg.	1088	960	760	Died 4 days	Cause of death not determined.

RABBITS INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN—*continued.*

VIRULENT VIRUSES—*continued.*

INTRAVENOUS INOCULATIONS—*continued.*

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Number of Rabbit.	Weight in Grammes.		Duration of Life.	Result.
					Initial.	Final.		
H. 69. "F.K."—*continued.*	Human meninges through G.P. 1924.	153 days	1·0 mg.	1021	1,200	1,000	Died 6 days	Early tuberculosis of lungs. No tubercles were visible elsewhere. T.B. were numerous in a smear from the rib marrow.
			0·1 mg.	1020	1,200	1,030	Died 16 days	General tuberculosis.
H. 77. "R.L." (*Primary abdominal tuberculosis.*)	Human mesenteric gland.	121 days	1·0 mg.	1245	1,450	1,100	Died 20 days	General tuberculosis.
			0·1 mg.	1246	1,370	1,250	Died 23 days	General tuberculosis.
	Human liver through G.P. 2102.	74 days	1·0 mg.	1232	1,030	820	Died 17 days	General tuberculosis.
			0·1 mg.	1233	1,030	770	Died 22 days	Acute general tuberculosis.
H. 88. "E.L." (*Primary abdominal tuberculosis.*)	Human mesenteric gland.	86 days	1·0 mg.	1398	1,350	1,100	Died 13 days	General tuberculosis.
			0·1 mg.	1399	1,300	970	Died 25 days	General tuberculosis.
H. 89. "W.I." (*Primary abdominal tuberculosis.*)	Human mesenteric gland.	69 days	1·0 mg.	1477	940	700	Died 10 days	Acute general tuberculosis.
	Human lung through G.P. 2474.	123 days	0·1 mg.	1545	1,650	1,350	Died 22 days	General tuberculosis.
H. 127. "R.R." (*a*) (*Tuberculosis of the lung.*)	Human sputum through G.P. 3474.	38 days	0·1 mg.	2271	1,500	1,200	Died 15 days	General miliary tuberculosis.
			0·01 mg.	2270	2,100	1,550	Died 30 days	General tuberculosis.
H. 128. "D.D." (*a*) (*Tuberculosis of the lung.*)	Human sputum through G.P. 3584.	35 days	0·1 mg.	2313	1,350	1,050	Died 18 days	General tuberculosis.
			0·01 mg.	2312	1,200	1,050	Died 24 days	General tuberculosis.

Intraperitoneal Inoculations.

H. 69. "F.K." (*Primary abdominal tuberculosis.*)	Human mesenteric gland through G.P. 1962.	64 days	1·0 mg.	1089	1,380	1,030	Died 19 days	General tuberculosis.
			0·1 mg.	1090	1,060	950	Died 49 days	General tuberculosis.
	Human meninges through G.P. 1924.	153 days	1·0 mg.	1023	2,420	1,620	Died 19 days	General tuberculosis.
			0·1 mg.	1022	1,340	1,100	Died 22 days	General tuberculosis.
H. 77. "R.L." (*Primary abdominal tuberculosis.*)	Human mesenteric gland.	121 days	1·0 mg.	1247	1,100	920	Died 7 days	Early tuberculosis of peritoneum. Death from pseudo-tuberculosis.
			0·1 mg.	1248	1,200	1,050	Died 22 days	General tuberculosis.
	Human liver through G.P. 2102.	74 days	1·0 mg.	1234	930	870	Died 14 days	Acute general tuberculosis.
H. 88. "E.L." (*Primary abdominal tuberculosis.*)	Human mesenteric gland.	86 days	1·0 mg.	1400	1,100	890	Died 15 days	Acute general tuberculosis.
			0·1 mg.	1401	1,450	—	Died 27 days	General tuberculosis.
H. 89. "W.I." (*Primary abdominal tuberculosis.*)	Human mesenteric gland.	69 days	1·0 mg.	1478	1,140	1,050	Died 112 days	General tuberculosis—inoculation mainly into the stomach.
	Human lung through G.P. 2474.	123 days	0·1 mg	1546	1,620	1,270	Died 36 days	General tuberculosis.

Subcutaneous Inoculations.

H. 69. "F.K." (*Primary abdominal tuberculosis.*)	Human mesenteric gland through G.P. 1962.	64 days	10·0 mg.	1091	1,500	1,070	Died 81 days	General tuberculosis.
			1·0 mg.	1092	1,050	1,250	Died 92 days	General tuberculosis.
		259 days	10·0 mg.	1392	1,250	1,150	Died 46 days	General tuberculosis.
			10·0 mg.	1393	1,500	1,350	Died 55 days	General tuberculosis.
	Human meninges through G.P. 1924.	153 days	10·0 mg.	1025	2,440	2,340	Died 25 days	General tuberculosis.
			1·0 mg.	1024	1,850	1,220	Died 63 days	General tuberculosis.
		389 days	50·0 mg.	1394	1,350	920	Died 31 days	General tuberculosis.
			10·0 mg.	1395	1,100	900	Died 54 days	General tuberculosis.

RABBITS INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN—*continued.*

VIRULENT VIRUSES—*continued.*

SUBCUTANEOUS INOCULATIONS—*continued.*

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Number of Rabbit.	Weight in Grammes.		Duration of Life.	Result.
					Initial.	Final.		
H. 77. "R.L." (*Primary abdominal tuberculosis.*)	Human mesenteric gland.	121 days	10·0 mg.	**1249**	1,100	940	Died 56 days	General tuberculosis.
			1·0 mg.	**1250**	900	900	Died 84 days	General tuberculosis.
	„	361 days	10·0 mg.	**1584**	3,070	2,750	Died 65 days	General tuberculosis.
			10·0 mg.	**1585**	1,950	1,550	Died 66 days	General tuberculosis with pseudo-tuberculosis of mesenteric glands.
	Human liver through G.P. 2102.	74 days	10·0 mg.	**1235**	730	950	Died 56 days	General tuberculosis.
H. 88. "E.L." (*Primary abdominal tuberculosis.*)	Human mesenteric gland.	86 days	50·0 mg.	**1402**	1,320	1,250	Died 50 days	General tuberculosis.
			10·0 mg.	**1403**	1,200	860	Died 9 days	Cause of death unascertained.
H. 89. "W.I." (*Primary abdominal tuberculosis.*)	Human mesenteric gland.	69 days	10·0 mg.	**1479**	1,190	910	Died 39 days	General tuberculosis.
			10·0 mg.	**1480**	930	820	Died 30 days	General tuberculosis and coccidiosis of liver.
	Human lung through G.P. 2474.	123 days	3·3 mg.	**1547**	1,220	1,320	Died 34 days	General tuberculosis.
			1·0 mg.	**1548**	1,140	920	Died 10 days	No obvious cause for death. No sign of tuberculosis.
	„	208 days	10·0 mg.	**1684**	1,150	1,050	Died 29 days	Acute general tuberculosis
			10·0 mg.	**1685**	1,000	1,050	Died 52 days	General tuberculosis.
H. 127. "R.R." (*a*) (*Tuberculosis of the lung.*)	Human sputum through G.P. 3474.	38 days	10·0 mg.	**2273**	1,800	1,150	Died 40 days	General tuberculosis.
			5·0 mg.	**2272**	1,200	900	Died 47 days	General tuberculosis.
		89 days	10·0 mg.	**2356**	1,300	1,150	Died 53 days	General tuberculosis.
			10·0 mg.	**2357**	1,250	1,000	Died 41 days	General tuberculosis.

	Human sputum through G.P. 3475.	120 days	10·0 mg.	2380	1,400	1,100	Died 52 days	General tuberculosis.
			10·0 mg.	2381	1,400	900	Died 58 days	General tuberculosis.
H. 127. "R.R." (*b*)	Human sputum through G.P. 3742.	41 days	10·0 mg.	2392	1,570	1,100	Died 50 days	General tuberculosis.
			8·0 mg.	2391	1,970	1,400	Died 54 days	General tuberculosis.
	Human sputum through G.P. 3743.	50 days	10·0 mg.	2389	1,800	1,280	Died 60 days	General tuberculosis.
			10·0 mg.	2390	1,950	1,050	Died 50 days	General tuberculosis.
			5·0 mg.	2388	2,400	1,690	Died 54 days	General tuberculosis.
H. 127. "R.R." (*c*)	Human sputum direct.	115 days	5·0 mg.	2461	1,650	1,200	Died 56 days	General tuberculosis.
			1·0 mg.	2460	1,500	1,320	Died 117 days	General tuberculosis.
H. 127. "R.R." (*d*)	Human sputum through G.P. 3784.	65 days	10·0 mg.	2442	1,600	1,200	Died 64 days	General tuberculosis.
			10·0 mg.	2443	1,400	1,070	Died 69 days	General tuberculosis.
			10·0 mg.	2444	1,500	1,390	Died 31 days	General tuberculosis.
	Human sputum direct.	115 days	40·0 mg.	2459	1,600	1,000	Died 41 days	General tuberculosis.
			10·0 mg.	2457	1,700	1,400	Died 56 days	General tuberculosis.
			10·0 mg.	2458	1,500	1,500	Died 87 days	General tuberculosis.
H. 128. "D.D." (*a*) (*Tuberculosis of the lung.*)	Human sputum through G.P. 3584.	35 days	30·0 mg.	2315	1,200	1,020	Died 38 days	General tuberculosis.
			10·0 mg.	2314	1,100	1,700	Died 38 days	General tuberculosis.
		77 days	1·0 mg.	2362	1,750	1,250	Died 73 days	General tuberculosis.
			1·0 mg.	2363	1,800	1,700	Died 41 days	General tuberculosis.
H. 128. "D.D." (*b*)	Human sputum direct.	85 days	10·0 mg.	2445	1,600	1,350	Died 46 days	General tuberculosis.
			10·0 mg.	2446	1,300	1,200	Died 47 days	General tuberculosis.
	Human sputum through G.P. 3782.	59 days	10·0 mg.	2433	1,550	1,200	Died 74 days	General tuberculosis.
			10·0 mg.	2434	1,250	1,100	Died 36 days	General tuberculosis.

RABBITS INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN—*continued.*

SLIGHTLY VIRULENT VIRUSES.

INTRAVENOUS INOCULATIONS.

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Number of Rabbit.	Weight in Grammes.		Duration of Life.	Result.
					Initial.	Final.		
H. 67. "E.P." (*Multiple tuberculosis of bones.*)	Pus from scapular abscess through G.P. 1914.	108 days	1·0 mg.	**963**	2,620	1,220	Died 113 days	General tuberculosis, not severe. The lungs contained a few caseous tubercles, and a soft caseous nodule in the margin of each caudal lobe. The kidneys showed on the surface numerous depressed scars and a grey tubercle or two, and in the medulla discrete caseous tubercles (in the right there were also caseous streaks, and pus in the calyces). Here and there in the muscles a caseous tubercle was seen; there was a caseous mass on the costal extremity of each 12th rib (in a smear from one T.B. were fairly numerous); in the olfactory process near the bulb a caseous nodule was seen, involving its whole thickness (T.B. numerous); and in the cancellous tissue of the vault of the skull there were some small yellow patches (T.B. were found in a smear from one).
			0·1 mg.	**964**	2,170	2,120	Killed 126 days	In the dorsal border of the right caudal lobe there were two soft caseous nodules; elsewhere in the lung a few small tubercles were seen. The left kidney showed three caseous tubercles in the medulla, the right a caseous streak; both had a few small scars on the surface.
H. 68. "R.B." (*Tuberculosis of the sacrum.*)	Pus from sacral abscess.	190 days	1·0 mg.	**990**	2,050	1,020	Died 43 days	General tuberculosis. The lungs were very closely beset with caseous tubercles. In the kidneys there were fairly numerous tubercles, small and grey in the cortex, larger yellow and caseous in the medullae. The spleen contained a few small tubercles. There were numerous caseous nodules in the bronchial glands, and caseous tubercles in several of the peripheral glands. T.B. were seen in a smear made from a spleen tubercle.
			0·1 mg.	**991**	2,350	2,300	Killed 124 days	In the lungs which were crepitant there was a moderate number of tubercles, the larger caseous and calcareous, and in the caudal lobes several large thin-walled nodules with caseous contents. Each kidney showed miliary tubercles on the surface and a few fine caseous streaks, or small tubercles, in the medulla. A few miliary caseous tubercles were found in the muscles.
H. 70. "N.W." (*Primary abdominal tuberculosis.*)	Human cervical glands through G.P. 1933.	62 days	1·0 mg.	**998**	1,550	820	Died 26 days	The lungs were congested and oedematous and contained fairly numerous small grey tubercles (a few were caseous); similar tubercles were seen in the kidneys. The bronchial glands were enlarged and contained irregular caseous nodules. T.B. were found in the marrow.
	Human mesenteric glands through G.P. 1928.	50 days	1·0 mg.	**973**	1,470	1,800	Died 140 days	General tuberculosis. The lungs contained numerous discrete gritty caseous tubercles, and in the thin margins there were several caseous areas. The kidneys showed numerous pits and scars on the surfaces and contained caseous streaks and foci in the medulla and caseo-pus in the pelves. The testes (enlarged), the vesiculae seminales and the seminal tubes were filled with caseo-pus. Caseous tubercles were sparsely scattered throughout the muscles. T.B. were numerous in an emulsion of the lung, and in smears from a testicle and the vesiculae seminales.

			0·1 mg.	974	1,900	1,000	Died 123 days	General tuberculosis. There were scattered submiliary tubercles in the lungs and in the tip of each caudal lobe a group of small caseous gritty nodules. In each kidney there were caseous streaks and tubercles. Caseous tubercles were rather numerous in the muscles of the back, scanty elsewhere in the muscles. The crest of one of the iliac bones and nearly all the spinous processes of the vertebræ were enlarged and filled with soft caseous substance. In the deep areolar tissues of both ears there were caseous nodules. Between the conjunctiva and the sclerotic of one eye there was a group of three caseous tubercles, and in the iris a millet seed sized caseous tubercle. T.B. were numerous in a muscle tubercle and in a smear made from diseased bone.
	Human lung	141 days	1·0 mg.	984	2,300	1,200	Died 36 days	General tuberculosis. The greater part of the lung was crepitant and contained moderately numerous small grey tubercles, the larger caseous in the centre; there were solid areas along the margins of the lung in which the tubercles were larger and more numerous, the majority being caseous throughout. The kidneys contained similar tubercles. There were caseous patches in the bronchial glands, an occasional tubercle in the abdominal glands, and a few caseous foci in the muscles. T.B. could not be found in the marrow, but were fairly numerous in a focus from a muscle.
	Human bronchial gland.	140 days	1·0 mg.	979	2,040	1,300	Died 131 days	Chronic general tuberculosis. The ventral parts of the lung were consolidated, and showed a few caseous foci. At the tips of the caudal lobes there were coalescing caseous nodules, and in the crepitant lung tissue discrete caseous gritty tubercles. The kidneys showed on the surface numerous irregular congested pits and a few large scars, and in the substance caseous streaks and foci and a few grey tubercles; many of the calyces were filled with caseo-pus. There were scattered caseous tubercles in the muscles, and the cavity of the internal ear on each side was filled with caseo-pus, in which T.B. were numerous.
			0·1 mg.	980	1,580	1,400	Died 178 days	Chronic general tuberculosis. The posterior portions of the caudal lobes were extensively replaced by large thin-walled soft caseous nodules; elsewhere the lung contained numerous caseous tubercles, often confluent around the margins. There were three soft caseous nodules in the medulla of one kidney, and caseo-pus in the pelvis of the other; both showed several large depressed scars on the surface. Both testicles and epididymes were enlarged and caseous throughout.
H. 72. "H.C." (*Tuberculosis of a rib.*)	Pus from abscess of rib through G.P. 1945.	82 days	1·0 mg.	1004	1,680	1,250	Died 146 days	Chronic general tuberculosis. In each caudal lobe there was a group of thin-walled caseo-purulent nodules; elsewhere in the lung caseous nodules of various sizes up to a hempseed were sparsely scattered. One bronchial gland contained two similar nodules. The kidneys showed a few small tubercles, and several of the calyces of the right were filled with caseo-pus. A few caseous tubercles or nodules were found in the loose tissues over the parietal bones, in the muscles of the back, and over the iliac crests. T.B. were numerous in a nodule from the latter situation.
			0·1 mg.	1005	1,580	1,150	Died 173 days	Slight tuberculosis with pseudo-tuberculosis of the spleen and the mesenteric glands. In the caudal lobes of the lungs half a dozen small caseous nodules were seen; elsewhere there were a few minute tubercles. The bronchial glands showed a caseo-calcareous network, and the kidneys a few small grey tubercles and soft caseous nodules of the usual type; the surfaces of the latter showed also a few small pits. An occasional tubercle was seen in the muscles.

RABBITS INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN—*continued.*

SLIGHTLY VIRULENT VIRUSES—*continued.*

INTRAVENOUS INOCULATIONS—*continued.*

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Number of Rabbit.	Weight in Grammes.		Duration of Life.	Result.
					Initial.	Final.		
H. 74. "D.S." (*Primary abdominal tuberculosis.*)	Human mesenteric glands.	77 days	1·0 mg.	**1153**	1,200	1,090	Killed 141 days	There were two or three caseous patches in the thin margins of the lungs, a caseous nodule in the tip of one caudal lobe, and a few minute tubercles elsewhere. The kidneys showed fairly numerous miliary caseous tubercles and a number of small pits on the surface, and soft caseous tubercles and streaks in the medulla. Small caseous tubercles were seen in the muscles.
			0·1 mg.	**1154**	1,000	930	Died 123 days	There were two small caseous nodules and a small tubercle in the lungs, and about half a dozen small caseous tubercles in each kidney; the calyces of the right contained caseo-pus. Caseous tubercles were scattered about in the muscles. The cause of death was not apparent.
	Human lung through G.P. 2004.	63 days	1·0 mg.	**1183**	870	840	Died 122 days	The lungs were crepitant and contained scattered caseous tubercles and two or three caseating patches. Both kidneys showed fairly numerous tubercles in the medulla, some soft yellow and caseous, the majority grey and opaque; on the surface of each was a single caseous tubercle.
			0·1 mg.	**1184**	860	1,770	Killed 126 days	The lungs were crepitant and showed about nine small grey tubercles and a grey patch with caseous foci at the tip of one caudal lobe. There were a few tubercles, some grey, others yellow and caseous, in the medulla of each kidney.
	Human bronchial gland.	77 days	1·0 mg.	**1146**	1,650	1,630	Died 42 days	The lungs were crepitant and contained fairly numerous evenly distributed grey miliary tubercles; there were one or two caseous points in the bronchial glands, and a few small greyish translucent tubercles in the kidneys.
			0·1 mg.	**1147**	1,000	950	Died 246 days	Slight chronic general tuberculosis. The lungs were crepitant and contained scattered firm caseous nodules up to 1 cm. in diameter and a few pinhead tubercles. The kidneys showed on the surface irregular scars, and in the medullae a few small greyish areas; one contained also a few caseous foci. The spleen was atrophied, but contained no tubercles. There were a few small caseous tubercles in the muscles, and one caseo-calcareous nodule in a mesenteric gland.
	Human spleen	86 days	1·0 mg.	**1170**	1,400	860	Died 33 days	General tuberculosis. About half the lung was firm, reddish, and airless, and showed minute greyish-white points; the crepitant portions contained fairly numerous minute grey tubercles. The bronchial glands were enlarged and congested, and showed one or two caseous points. The spleen showed numerous small grey tubercles, many with yellow centres; the liver and kidneys numerous minute foci, probably tubercles. A few T.B. were seen in smears from the marrow and spleen, none in smears from the liver and kidney.

H. 75. "A.H." (*Primary abdominal tuberculosis.*)	Human peritoneal fluid through G.P. 2018.	99 days	1·0 mg.	**1205**	2,850	1,880	Killed 101 days	General tuberculosis. The lungs were moderately closely beset with grey caseating nodules up to a hempseed in size, and the thin margins were largely occupied by grey caseating patches. The kidneys showed numerous projecting nodules, grey with caseous centres; the pelvis of the right was filled with caseo-pus. The mammary gland was entirely replaced by caseo-purulent nodules; the iris of each eye contained tubercles, and the lachrymal glands were enlarged and closely beset with caseous nodules. There were caseous tubercles on the peritoneum, and a few caseo-calcareous tubercles in the areolar tissues of the axillae, the groin, and over the pubes. T.B. were numerous in a nodule from the mammary gland, and in one from a lachrymal gland.
			0·1 mg.	**1206**	2,550	2,810	Killed 101 days	The lungs showed sparsely scattered grey miliary tubercles, and in the margins a few grey patches containing caseous foci. Each kidney showed a few tubercles, mostly grey with caseous centres.
	Human lung through G.P. 2459.	47 days	1·0 mg.	**1431**	770	900	Died 13 days	The lungs were crepitant and showed scattered minute grey tubercles, and the kidneys were speckled with similar tubercles; the spleen was slightly enlarged (T.B. were moderately numerous in a smear preparation made from it). The cause of death was not determined.
			0·1 mg.	**1432**	870	620	Died 66 days	The lungs were extensively replaced by firm grey nodules speckled with indefinite caseous foci and confluent around the margins and in the anterior lobes. The kidneys showed numerous minute pits on the surface, and scattered caseous tubercles on surface and on section. One sternal gland contained a caseous focus.
H. 76. "G.M." (*Tuberculosis of a kneejoint.*)	Synovial membrane through G.P. 2887.	38 days	1·0 mg.	**1780**	2,900	2,400	Died 44 days	General tuberculosis. The lungs were crepitant and contained a moderate number of minute glassy tubercles. There were a few pinhead caseous tubercles in the bronchial glands. The spleen and liver each contained a few minute yellow tubercles. The kidneys showed on the surfaces numerous caseous tubercles up to a pin's head in size; in the medullae there were larger but less numerous caseous tubercles. There were fairly numerous miliary caseous tubercles on the peritoneum and mesentery, and many lymphatic glands contained small caseous patches or tubercles.
			0·01 mg.	**1781**	1,800	1,520	Died 7 days	Death was due to injuries. There was no sign of tuberculosis.
H. 78. "O.D." (*General tuberculosis probably primary in cervical glands.*)	Human lung through G.P. 2123.	60 days	1·0 mg.	**1200**	2,810	2,150	Killed 141 days	The posterior halves of the caudal lobes were occupied by caseous masses; the margins of the other lobes were tuberculous; elsewhere in the lung discrete tubercles were seen. The kidneys showed numerous scars and a few grey nodules and tubercles on the surfaces, and caseous streaks and foci in the medullae; the calyces of the left were distended with caseo-pus.
			0·1 mg.	**1201**	2,550	2,400	Killed 141 days	In the caudal lobes several thin-walled soft caseous masses were seen, and around the margins of the lungs patches of dense caseated tissue; there were discrete caseous tubercles with grey margins elsewhere in the lung. Both kidneys showed numerous pits on the surface, and contained a few small tubercles; in the cortex of the left a grey wedge-shaped nodule caseous in the centre was also seen.
	Human bronchial gland.	98 days	1·0 mg.	**1215**	1,120	1,100	Died 18 days	General tuberculosis. Both anterior and the right middle lobes of the lung were consolidated, and the whole organ was beset with minute grey tubercles. The enlarged bronchial glands showed patches of early caseation. Minute grey points could be seen in the heart muscle and on the endocardium; they were numerous in the liver and the spleen, which was much enlarged and dark red in colour; numerous submiliary grey tubercles were seen in the kidneys.

RABBITS INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN—*continued.*

SLIGHTLY VIRULENT VIRUSES—*continued.*

INTRAVENOUS INOCULATIONS—*continued.*

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Number of Rabbit.	Weight in Grammes.		Duration of Life.	Result.
					Initial.	Final.		
H. 78. "O.D."—*continued.*	Human bronchial gland.	98 days	0·1 mg.	**1216**	1,020	1,700	Killed 140 days	Scattered patches of the lung, mostly situated around the margins, were composed of solid reddish-grey or grey tissue with caseous foci; elsewhere a few discrete tubercles were seen. Each bronchial gland contained a soft caseous tubercle. The kidneys showed numerous irregular scars on the surfaces in many of which grey tubercles were seen, and two large grey nodules with caseous foci; and some caseous nodules and streaks in the medullae.
	Human meninges through G.P. 2122.	77 days	1·0 mg.	**1212**	1,250	850	Died 28 days	General tuberculosis. The lungs were closely beset with grey miliary tubercles with caseous centres, which caused complete consolidation of the anterior lobes, and partial of the caudal lobes. There were numerous minute grey tubercles in the heart muscle, in the liver and kidneys. The spleen was not enlarged and no tubercles were seen on section. The bronchial glands contained small caseous patches.
			0·1 mg.	**1211**	2,100	1,950	Died 171 days	General tuberculosis. The lungs were large and almost entirely composed of confluent caseating nodules and tubercles. The kidneys showed several fibro-caseous nodules of various sizes projecting from the surface; there was a similar nodule also in the pelvis of the left. The right testicle was greatly enlarged (5 × 3 × 2 cm.) and composed throughout of caseous substance, and the spermatic cord was distended with caseo-pus; the left was normal. T.B. were not found in smears from the liver or the spleen.
H. 79. "J.N." (*Tuberculosis of lung.*)	Human lung	85 days	1·0 mg.	**1221**	1,870	1,200	Died 33 days	General tuberculosis. The lungs were crepitant and contained sparsely scattered small tubercles, the larger caseous in the centre; the bronchial glands were partly caseous. The kidneys showed numerous small grey tubercles in the cortices, and miliary caseous tubercles in the medullae; the liver contained sparsely scattered minute foci; in the heart muscle one or two tubercles were seen, and there were a few minute foci in the suprarenals. A few T.B. were seen in a smear from the spleen, none in one from the liver.
			0·1 mg	**1222**	1,750	1,570	Killed 185 days	The posterior parts of each caudal lobe were partly occupied by softened caseous nodules, elsewhere in the lung fairly numerous discrete caseous nodules and tubercles were seen. The bronchial glands contained small gritty caseous patches. The kidneys showed numerous large irregular scars and scattered miliary tubercles on the surfaces, some centrally caseous, and in the medullae soft caseous tubercles and streaks.

H. 80. "D.M." (*Tuberculosis of lung.*)	Human lung	81 days	1·0 mg.	1255	1,120	790	Died 83 days	Chronic general tuberculosis not severe. Around the margins of the lungs there were flattened caseous patches, in the rest of the organ a fair number of small tubercles was seen, the larger with caseous centres. The bronchial glands contained small caseous nodules. The kidneys showed on the surface numerous minute congested pits, and fairly numerous minute caseous tubercles and a few nodules, and in the medulla a few caseous streaks. The muscles showed sparsely scattered minute caseous tubercles.
			0·1 mg.	1256	1,450	1,950	Died 249 days	Chronic general tuberculosis. The lungs showed the usual firm patches of caseating tuberculous tissue around the margins; in the substance there was an occasional tubercle or caseating nodule. The left kidney was enlarged and showed on the surface large areas composed of aggregated grey nodules which projected; on section the nodules were caseous in the centre and wedge shaped; several of the calyces of the kidney contained mucoid pus. The right kidney was similar but showed only one large nodular patch; there was caseo-pus in the pelvis. Under the left eye there was a yellow thin-walled fluctuating swelling the size of a thrush's egg, which pushed the eye upwards and backwards; the right lachrymal gland contained two pea-sized caseous nodules. Under the fascia of one of the muscles of the back there was a small caseous nodule. A smear from the lachrymal gland showed fairly numerous T.B.
H. 81. "P.W." (*Tuberculosis of lung.*)	Human lung	72 days	1·0 mg.	1251	1,250	950	Died 81 days	The lungs were crepitant and showed scattered caseating miliary tubercles, and a few grey patches with caseous foci occurring chiefly in the margins. The kidneys showed a few grey tubercles in the cortex and caseous tubercles in the medullae; one calyx of the left contained caseo-pus.
			0·1 mg.	1252	1,220	2,220	Killed 161 days	The lungs were crepitant, and showed about ten small greyish nodules; in the margin of one lobe there was a small grey patch speckled with caseous foci. No tubercles were found in the kidneys.
H. 82. "G.F." (*General tuberculosis primary in the alimentary tract.*)	Human mesenteric gland through G.P. 2239.	87 days	1·0 mg.	1427	850	780	Died 75 days	Tuberculosis of lungs and kidneys. The anterior portions of the lungs were solid and airless and beset with grey tubercles with caseous centres; the margins of the caudal lobes were solid and caseating, and in the rest of the caudal lobes there were discrete tubercles, the larger with caseous centres. The kidneys showed on the surfaces numerous minute pits and grey tubercles, and in the medullae some caseous foci. There was no tuberculosis elsewhere.
			0·1 mg.	1428	870	1,120	Died 158 days	Death from purulent pleurisy. The lungs contained fairly numerous grey miliary tubercles with caseous centres. One bronchial gland showed a caseous focus. The kidneys showed numerous reddish pits on the surface, which were found to be the extremities of fibrous or fibro-caseous streaks. There was some caseo-pus in the pelves. There was no tuberculosis elsewhere.
	Human lung through G.P. 2242.	81 days	1·0 mg.	1301	1,700	2,150	Killed 117 days	The lungs contained two or three small tubercles, and in the margins two grey patches with caseous foci. The left kidney showed four soft caseous nodules on the surface and caseous tubercles in the medulla; the right was similar. The right epididymis was twice the size of the left, and was composed of grey nodules soft and caseous in the centre.
			0·1 mg.	1302	1,600	930	Died 36 days	Slight tuberculosis; the cause of death was not apparent. The lungs collapsed normally, and contained scattered caseous miliary tubercles and a number of grey nodules up to a split pea in size, caseous in the centre. The bronchial glands were slightly enlarged, and showed small caseous patches. The kidneys showed on the surface grey tubercles with minute caseous centres up to 0·5 mm., and there were a few larger tubercles in the medulla.

RABBITS INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN—*continued.*

SLIGHTLY VIRULENT VIRUSES—*continued.*

INTRAVENOUS INOCULATIONS—*continued.*

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Number of Rabbit.	Weight in Grammes.		Duration of Life.	Result.
					Initial.	Final.		
H. 83. "G.C." (*General tuberculosis primary in the alimentary tract.*)	Human mesenteric gland.	95 days	1·0 mg.	**1307**	1,670	850	Died 38 days	Slight tuberculosis; the cause of death was not apparent. The lungs contained sparsely scattered pinhead grey tubercles with caseous centres, and three or four small caseous nodules; the bronchial glands showed a few caseous tubercles. On the surface of the kidneys there were numerous small pits and scattered minute slightly opaque tubercles, and in the depth similar tubercles with more definite caseation.
			0·1 mg.	**1308**	1,420	2,770	Killed 126 days	The lungs showed sparsely scattered nodules from a pinhead to a hemp seed in size; the larger had thin fibrous walls and caseous contents, the smaller were grey with caseous centres. Each kidney showed numerous pits on the surface, and one or two groups of grey tubercles in the medulla.
	Human bronchial gland.	95 days	1·0 mg.	**1312**	1,400	960	Died 13 days	The lungs were crepitant and showed fairly numerous minute reddish-grey foci. There was no tuberculosis elsewhere, but the spleen was a little enlarged.
			0·1 mg.	**1313**	1,300	920	Died 22 days	General tuberculosis with pseudo-tuberculosis of the mesenteric glands. The lungs were mottled with congested foci, and showed fairly numerous grey tubercles with white centres. There were a few minute grey points on the endocardium of the right ventricle. One bronchial gland contained a tubercle. The liver was speckled with minute grey foci. There were fairly numerous minute tubercles in a slightly enlarged spleen, and a number of grey miliary tubercles in the kidneys. Smears from the lung showed numerous T.B., from the liver and spleen a few T.B.; in a smear from a kidney no T.B. were seen.
H. 86. "C.P." (*Tuberculosis primary in the lung.*)	Human meninges through G.P. 2395.	57 days	1·0 mg.	**1384**	1,350	1,020	Died 167 days	Chronic retrogressive general tuberculosis. The ventral parts of the anterior lobes were solid and caseous; the rest of the lung contained scattered caseous nodules up to 3 mm. and a number of minute grey tubercles. The kidneys showed small scars on the surface and soft caseous foci in the medullae; the calyces were filled with caseo-pus. The iris of each eye showed several tubercles and at the cornea-sclerotic junction of the right there was a nodule containing caseous foci. The left lachrymal gland contained two softened caseous nodules (smear T.B. numerous). There was one caseous tubercle in the muscles of the back.
			0·1 mg.	**1385**	1,070	1,450	Killed 221 days	Chronic general tuberculosis. The lungs were crepitant and contained from thirty to forty caseous nodules up to 1 cm. in diameter; the large ones, situated in the caudal lobes, were thin-walled and filled with caseo-pus. One kidney showed a caseous streak and two foci in the medulla. The synovial membrane of the right kneejoint showed a number of caseous nodules; the left was swollen and presented on each side of the quadriceps soft fluctuating yellow swellings; the right anklejoint was similar, and there were some smaller nodules under the tendons of the tarsus. Scattered about in the muscles there were yellow caseous tubercles.

H. 87. "W.D." (*Tuberculosis of the suprarenal bodies.*)	Human suprarenal through a guinea-pig.	56 days	10·0 mg.	1342	1,540	950	Died 26 days	The lungs were crepitant and contained fairly numerous small tubercles with caseous centres; in the anterior lobes some solid areas speckled with caseous foci were also seen. The bronchial glands contained small caseous patches. The kidneys showed numerous grey foci on the surface and in the medulla submiliary grey tubercles with caseous centres.
			1·0 mg.	1343	1,040	800	Died 14 days	The lungs were crepitant and a little congested and contained moderately numerous minute transparent grey tubercles. The bronchial glands showed a few very minute caseous points. The spleen showed enlargement of the Malpighian bodies (smear, a few T.B.) but no definite tubercles.
H. 93. "C.D." (*General miliary tuberculosis.*)	Human lung through G.P. 2610.	78 days	1·0 mg.	1637	1,320	900	Died 85 days	Tuberculosis of lungs (severe), bronchial glands, and kidneys. The lungs were enlarged firm and composed practically throughout of reddish grey tissue infiltrated with irregular caseous patches and foci. The bronchial glands contained a few small caseous patches. On the surface of each kidney there were fairly numerous caseous foci with grey margins, in the cortex of one a wedge-shaped grey nodule with soft caseous centre; in the medulla of each there were scattered soft yellow tubercles and a few caseous streaks.
			Rather less than 1·0 mg.	1635	710	630	Died 18 days	Acute tuberculosis. The lungs were almost entirely solid and grey; by reflected light the surfaces had a finely granular appearance due to numerous minute tubercles (smear, a few T.B.). The spleen was slightly enlarged and showed numerous just visible grey points (smear, T.B. numerous). Scattered pale grey tubercles were just visible in the kidneys.
			Rather less than 0·1 mg.	1636	1,390	1,170	Killed 232 days	Chronic general tuberculosis. The lungs showed scattered caseous tubercles with grey margins on the surface, and one or two in the depth. The tracheal glands contained caseo-calcareous nodules. The kidneys were extensively scarred and showed grey and yellowish foci on the surface; caseous streaks and caseous tubercles arranged in series were seen in the medulla; in each pelvis there was a small quantity of caseo-pus. There was pannus and tuberculous iritis of both eyes, and the lachrymal glands were enlarged caseous and softened. A xiphisternal and an axillary gland were enlarged and caseous.
	Acne spots through G.P. 2611.	89 days	1·0 mg.	1720	1,850	2,610	Killed 192 days	There was a large pea-sized caseous and softened nodule with a fibrous wall, and a few minute tubercles, in the lungs, and one tubercle in a kidney; there was no sign of disease elsewhere.
H. 98. "B.R." (*Tuberculous meningitis.*)	Cerebro-spinal fluid through G.P. 2878	49 days	1·0 mg.	1768	2,270	1,650	Died 68 days	The lungs contained scattered nodules up to a hempseed in size, some caseous, but the majority grey without caseation. The left kidney showed in the cortex a grey wedge-shaped nodule with a caseous centre, and a few miliary grey tubercles with caseous centres; the right showed a moderate number of small grey nodules, a few soft caseous tubercles in the medulla, and some caseo-pus in one or two of the calyces.
			0·1 mg.	1765	1,000	620	Died 59 days	Death from psorospermosis. The lungs showed scattered grey tubercles with caseous centres, mainly on the dorsal border. There were three tubercles in the kidneys.
			0·01 mg.	1764	1,000	2,800	Killed 162 days	There was one minute grey tubercle in the lung and no tuberculosis elsewhere.
H. 104. "E.R." (*Tuberculosis of lungs with calcareous mesenterio glands.*)	Human lung, direct	51 days	1·0 mg.	1807	2,650	2,240	Died 18 days	Early general tuberculosis and severe pseudo-tuberculosis of the spleen. The lungs contained scattered minute transparent tubercles. The liver showed scattered grey foci (smear, one T.B. seen), and the kidneys were speckled on the surface with minute grey foci. There was no tuberculosis elsewhere.

RABBITS INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN—*continued.*

SLIGHTLY VIRULENT VIRUSES—*continued.*

INTRAVENOUS INOCULATIONS—*continued.*

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Number of of Rabbit.	Weight in Grammes.		Duration of Life.	Result.
					Initial.	Final.		
H. 104. "E.R."—*continued.*	Human lung, direct	51 days	0·1 mg.	1808	1,250	1,210	Died 33 days	Death from cellulitis. The lungs contained scattered tubercles mainly transparent and minute, a few with caseous centres, and some larger grey nodules; the cortex of each kidney showed fairly numerous grey miliary tubercles; there was no tuberculosis elsewhere.
			0·01 mg	1809	800	600	Died 16 days	Death from psorospermosis of the liver. There were a few minute grey tubercles in the lungs and no tuberculosis elsewhere.
	,,	80 days	0·01 mg.	1844	990	1,700	Killed 152 days	There were a few irregular grey tubercles in the lungs; the kidneys showed small scars on the surfaces and in the medullae nodules or patches some resembling congeries of grey foci. There was no tuberculosis elsewhere.
	Human mesenteric gland, direct	87 days	1·0 mg.	1845	1,400	950	Died 24 days	Acute general tuberculosis. The lungs were red and hepatised and closely beset with minute grey tubercles; the bronchial glands were enlarged and contained small caseous patches; the spleen was swollen, but no tubercles were visible in it; the kidneys were speckled with minute grey tubercles. There was no visible tuberculosis elsewhere.
			0·1 mg.	1846	1,350	1,450	Died 131 days	Death from cellulitis. On the left caudal lobe of the lung there was a large greyish-yellow area, varying in thickness and composed of caseo-calcareous substance surrounded by fibroid tissue; in the lung substance there were scattered transparent grey tubercles. The bronchial glands contained a few small calcareous patches. There were several depressed cicatrices on the surface of each kidney, and soft caseous gritty streaks in the medullae. No tuberculosis elsewhere.
			0·01 mg.	1847	1,350	1,750	Killed 143 days	The lungs contained one or two minute tubercles, scattered greyish foci resembling healed tubercles, and at the posterior tip of each caudal lobe a caseous and softened nodule. In the medullae of the kidneys three firm greyish nodules with slight central caseation were seen. There was no tuberculosis elsewhere.
H. 115. "N.G." (*Tuberculous meningitis.*)	Cerebro-spinal fluid through G.P. 3087	58 days	0·1 mg.	1984	2,120	2,270	Killed 145 days	Tuberculosis of lungs (severe), kidneys and mamma. Almost the whole of the anterior lobes and the antero-ventral portions of the caudal lobes were consolidated, being composed of pinkish fibroid tissue riddled with small cavities containing caseo-pus, or beset with calcareous grains. The rest of the caudal lobes of the lungs contained separate large masses composed of caseo-pus in a network of fibrous trabeculae. The calyces of the left kidney were filled with pus and there were a few caseous nodules in the medulla. On the surface of the right there were cicatrices and two tubercles, and on section two caseous streaks were seen. The mammary glands were enlarged and the alveoli filled with caseo-pus.
			0·1 mg.	1985	2,400	,670	Died 23 days	Death was due to injuries. There were scattered very minute grey foci in the lungs and no tuberculosis elsewhere.

H. 118. "F.C." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3343.	55 days	0·1 mg.	**2114**	1,250	1,150	Died 126 days	The lungs showed on the surface about twenty small grey tubercles, and the free margin of one caudal lobe was thickened and showed confluent caseous tubercles. The right kidney contained seven small tubercles, the left one. The cause of death was not apparent.
			0·01 mg.	**2115**	1,620	2,100	Killed 152 days	Slight retrogressive tuberculosis. The lungs showed scattered tubercles, some small and grey, others larger with caseous gritty centres, and in the tip of each caudal lobe there was a small caseous gritty nodule. One kidney contained two small whitish tubercles, and small pits were seen on the surface of both kidneys. Rather numerous miliary caseous tubercles were seen on the omentum, meso-colon, meso-uterus, and on the transverse sulci of the colon.
H. 119. "E.S." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3439.	19 days	0·1 mg.	**2186**	2,000	1,220	Died 65 days	Tuberculosis of lungs and kidneys. The lungs were pneumonic and chiefly composed of firm translucent grey tissue containing small yellow foci; the free margins of the lungs were composed of firm caseo-necrotic substance. The bronchial glands were slightly enlarged. The kidneys showed both on surface and on section a moderate number of small grey tubercles the majority with yellowish-white centres.
			0·01 mg.	**2187**	2,000	1,900	Killed 95 days	Slight generalised retrogressive tuberculosis. The lungs contained a moderate number of caseo-calcareous nodules (up to 3 mm.) most numerous on the dorsal surface where they formed irregular tracts; the thin margins of the anterior lobes were composed of reddish-grey tissue with caseo-calcareous foci. The kidneys contained a moderate number of grey miliary tubercles with caseous centres. There were caseous tubercles in the portal gland and one in a tracheal gland.
H. 120. "B.W." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3442.	22 days	0·1 mg.	**2192**	1,950	1,100	Died 86 days	General tuberculosis, moderately severe in lungs. The thin margins of the lungs, the thin anterior parts of the cephalic lobes, and the posterior dorsal surfaces of the caudal lobes were almost uniformly caseous, elsewhere on the surfaces were caseating nodules and tubercles, numerous dorsally, scattered ventrally; the lung substance was crepitant and contained scattered caseating tubercles. The bronchial glands contained caseous nodules. There was a moderate number of small grey tubercles in the liver (smear, a few T.B.). The kidneys showed fairly numerous small caseous tubercles and many small pits on the surface, also two larger tubercles which extended as caseous streaks into the substance. Many of the lymphatic glands contained each a minute focus or two and there were scattered caseous tubercles in the muscles.
			0·01 mg.	**2193**	1,970	2,500	Killed 98 days	Around the margins of the caudal lobes of the lungs there was a zone of grey tissue with caseo-calcareous foci in it; a few flat grey nodules with caseous centres were seen on the surface of one caudal lobe; elsewhere scattered grey tubercles the larger with opaque centres, were seen. A few caseo-calcareous tubercles were seen in the cortex of each kidney. One tracheal gland contained a calcareous patch.

RABBITS INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN—*continued.*

SLIGHTLY VIRULENT VIRUSES—*continued.*

INTRAVENOUS INOCULATIONS—*continued.*

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Number of Rabbit.	Weight in Grammes.		Duration of Life.	Result.
					Initial.	Final.		
H. 121. "E.A." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3445.	28 days	0·1 mg.	**2200**	2,220	1,800	Killed 94 days	Generalised tuberculosis, moderately severe in lungs. The lungs collapsed only partially; they showed on the surface moderately numerous irregular grey nodules with caseous foci (up to 8 mm.); many were united together and there was a continuous zone of tuberculous tissue around the margins. Similar but less numerous nodules were seen in the depth of the lung. A few small greyish tubercles were seen in the liver (smear, one T.B.). The kidneys showed on the surfaces numerous small pits and moderately numerous grey miliary tubercles with caseous centres; there were a few similar tubercles in the depth of the cortices, and a caseous tubercle or two in the medullae.
			0·01 mg.	**2201**	1,820	1,800	Killed 94 days	The lungs were crepitant; around the margins there was a broad band of grey tissue infiltrated with caseous foci; elsewhere on the surfaces irregular grey nodules infiltrated with caseous foci (up to 5 mm.) were scattered; one or two nodules were seen in the depth of the lung. There were a few pits on the surfaces of the kidneys, and in one a grey focus.
H. 122. "F.P." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3446.	22 days	0·1 mg.	**2196**	1,950	1,450	Killed 99 days	Slight general tuberculosis. The lungs were crepitant and showed on the surface a moderate number of tubercles, the majority with caseous centres; the thin margins of the lungs for a depth of 2–3 mm. were grey and beset with caseous foci; an occasional tubercle was seen on section of the lungs. On the surface of each kidney there were scattered grey tubercles with caseous centres; a few of the larger ones (2 mm.) extended deeply into the substance as caseous streaks. The Malpighian bodies of the spleen were prominent and grey (smear, no T.B.). One tracheal gland contained a softened caseous tubercle, and caseous tubercles were seen here and there in the muscles.
			0·01 mg.	**2197**	2,080	2,050	Killed 99 days	General tuberculosis. The lungs collapsed only partially; they were crepitant, and showed on the surface moderately numerous miliary tubercles, and a number of nodules, reddish-grey and beset with caseous foci, up to a pea in size (smear, a moderate number of T.B.). The thin margins of the caudal lobes and the ventral halves of the cephalic were reddish-grey and infiltrated with caseous foci. In the cortices of the kidneys there were scattered caseous miliary tubercles with grey margins, in the medullae an occasional tubercle, and in one calyx some caseo-pus. There were a few miliary caseous tubercles on a fold of the peritoneum between the kidneys, a few tubercles in the muscles of the thigh and in the subcutaneous tissues of each groin, and each mammary gland was enlarged firm reddish-grey and beset with small softened caseous areas (smear, T.B. numerous).

H. 123. "W.W." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3450.	25 days	0·1 mg.	**2208**	2,770	2,050	Died 14 days	Early general tuberculosis. The lungs were congested. The right middle lobe was greyish-red and solid, showing soft caseous foci on section; the rest of the lungs contained moderately numerous minute transparent grey tubercles. The bronchial glands were slightly enlarged. The spleen was much enlarged, soft, and showed under the capsule minute grey points, and in the pulp enlarged Malpighian bodies (smear, a few T.B.). The liver appeared normal (smear, a few T.B.). The kidneys were speckled with reddish points, but no tubercles were seen. A smear from the caseous foci in the lung showed no T.B., but numerous blue-stained organisms.
			0·01 mg.	**2209**	1,920	2,170	Killed 101 days	There was one caseous tubercle in the lungs and no sign of tuberculosis elsewhere.
H. 124. "M.M." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3452.	27 days	0·1 mg.	**2212**	2,100	1,050	Killed 100 days	General tuberculosis. The lungs collapsed partially; on the surfaces there were numerous irregular caseating nodules becoming confluent chiefly on the dorsal surfaces; on section numerous caseous nodules up to a hempseed in size were seen in the depth of the lung. There were a few caseous tubercles on the mediastinal pleura, and one bronchial gland contained several caseous gritty tubercles. The liver showed scattered grey tubercles, the spleen moderately numerous softened caseous tubercles (smear, T.B. numerous, many in clumps). The portal gland was beset with caseo-calcareous tubercles; the mesenteric glands contained numerous caseous foci, the iliac one or two. A few tubercles were seen on the omentum and mesocolon. There were one or two caseous tubercles in the wall of the colon, and in the subcutaneous tissues.
			0·01 mg.	**2213**	2,000	1,550	Killed 100 days	General tuberculosis (not severe). The lungs were crepitant and showed a moderate number of caseous tubercles with grey margins up to 2 mm. in diameter; there was a narrow zone of caseating tissue extending nearly all around the lung, and superficial caseating patches on the posterior dorsal borders of the caudal lobes; near the tip of one caudal lobe there was a caseous nodule, 1 cm. in diameter (smear, T.B. very numerous). There was one caseating nodule on the pleura, one caseous tubercle in the spleen, and a caseous focus in the portal gland. Each kidney showed on the surface numerous small pits and three or four miliary caseous tubercles, and in the depth a few caseous tubercles. The lymphoid follicles of the colon each showed an opaque yellow centre (smear, T.B. numerous). Two or three caseous tubercles were seen in the mesenteric glands.
H. 125. "A.P." (*Tuberculosis of the lungs.*)	Human sputum through G.P. 3454.	24 days	0·1 mg.	**2204**	2,200	1,450	Killed 100 days	Tuberculosis of lungs and kidneys, and of peritoneum (slight). The lungs showed in the thin margins and on the dorsal borders of the caudal lobes firm caseous belts in places more than a centimetre broad; elsewhere on the surface were caseous nodules with grey margins, in places confluent; on section these nodules and patches extended only a slight distance into the lung substance. In the depth of the lung were scattered caseous tubercles with grey margins. One bronchial gland contained two caseous foci. On the surface of the left kidney there were four caseating nodules (up to 2 mm.) and a few submiliary grey tubercles, and two caseous streaks were seen in the medulla. On the surface of the right kidney six miliary tubercles with caseous centres were seen, and there were three tubercles in the medulla. Beneath the peritoneum in the lumbar regions were three caseous tubercles.
			0·01 mg.	**2205**	1,600	1,600	Killed 100 days	The lungs contained very sparsely scattered grey miliary tubercles, some calcareous; in the left kidney two submiliary grey tubercles were seen. There was no tuberculosis elsewhere.

RABBITS INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN—*continued.*

SLIGHTLY VIRULENT VIRUSES—*continued.*

Intravenous Inoculations—*continued.*

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Number of Rabbit.	Weight in Grammes.		Duration of Life.	Result.
					Initial.	Final.		
H. 128. "A.W." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3456.	27 days	0·1 mg.	**2216**	2,100	2,200	Killed 102 days	The lungs contained scattered grey miliary tubercles with caseous centres, and a few larger caseating nodules, some in the thin margins. In the cortex of one kidney there was a cicatrix with a grey tubercle; the calyces of the other were distended with caseo-pus.
			0·01 mg.	**2217**	2,120	1,620	Died 27 days	Death was due to necrosis of the left ventricle. The lungs were congested and oedematous, and contained a moderate number of greyish-white miliary tubercles. There was no tuberculosis elsewhere.
H. 129. "T.M." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3479.	33 days	0·1 mg.	**2255**	2,850	1,200	Died 106 days	General tuberculosis. The greater portions of the anterior and the thin margins of the other lobes of the lungs were composed of greyish-red caseating tissue, and there were caseating coalescing patches on the dorsal surfaces of the caudal lobes; elsewhere on the surface discrete caseating nodules were seen; on section the lung tissue was crepitant, and contained scattered caseating nodules. The liver showed a few minute yellow foci: the spleen was normal. The kidneys showed on the surface numerous caseous tubercles and one or two slightly raised hempseed-sized nodules; on section caseous streaks were seen, and the calyces of one kidney were filled with caseo-pus. There were caseous tubercles in the iris of one eye, softened caseous nodules in the lachrymal glands, and caseous patches in the mammary gland.
			0·01 mg.	**2254**	2,700	2,450	Killed 119 days	General tuberculosis. The dorsal surfaces of the caudal lobes were covered with a thin sheet of caseating tissue; the thin margins all round the lungs and the thinner parts of the cephalic lobes were reddish-grey and caseating; elsewhere on the surface caseating tubercles or irregular grey streaks with caseous centres were seen. The spleen contained two caseous tubercles, the liver one doubtful tubercle. The kidneys showed on the surface numerous small pits and a moderate number of caseating tubercles; on section caseating streaks and tubercles were seen in cortex and medulla. There were a few grey tubercles in the iris of one eye and at the corneo-sclerotic junction a small caseating patch.
H. 130. "N.B." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3481.	29 days	0·1 mg.	**2234**	2,200	1,350	Died 23 days	The cause of death was not apparent. The lungs contained numerous sub-miliary grey tubercles; there were some solid patches in the right lung, but the organ was otherwise crepitant. The liver contained scattered minute foci, the kidneys a few pale spots, and the spleen was enlarged.
			0·01 mg.	**2235**	2,120	1,920	Died 59 days	Death was due to retention of a foetus. The lungs contained a moderate number of grey tubercles with caseo-calcareous centres, and the kidneys scattered grey miliary tubercles.

H. 131. "M.H." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3483.	29 days	0·1 mg.	2238	2,700	2,050	Died 41 days	Death from pseudo-tuberculosis. The lungs contained scattered tubercles, the the larger ones caseous; there was no tuberculosis elsewhere.
			0·01 mg.	2239	3,320	2,320	Died 78 days	The cause of death was not apparent. The lungs were crepitant and showed on the surface a moderate number of caseous nodules the largest the size of a split pea. One tracheal and one portal gland contained each one or two caseous foci. The kidneys contained altogether half a dozen small tubercles with caseous centres.
H. 132. "O.O." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3485.	29 days	0·1 mg.	2242	2,770	1,040	Died 117 days	Chronic general tuberculosis. The lungs were enlarged; on the dorsal surfaces there was a continuous sheet of caseating tissue covered with congested pleura; the margins of the caudal lobes and almost the whole of the anterior lobes were caseating; elsewhere in the lungs small scattered caseating nodules were seen. The spleen was very large and filled with recent blood-clot, in it some yellow foci were seen (smear, no T.B.). A few doubtful foci were seen in the liver. Each kidney showed on the surface a moderate number of caseous tubercles and a few grey nodules with caseous foci, and on section caseating streaks. The iris of the left eye showed a few caseous tubercles; the portal gland contained a few tubercles; the mammary glands were enlarged and caseous.
			0·01 mg.	2243	2,420	1,720	Killed 119 days	Chronic general tuberculosis. The lungs were in similar condition to those of Rabbit 2242 but the dorsal surfaces were not so completely covered. There were a few miliary caseous tubercles in each kidney. The whole mammary gland was enlarged and caseating. There was caseous necrosis of the head of the right tibia (smear from the pus, T.B. numerous) and the left knee-joint contained an excess of (opalescent) synovial fluid (smear from the fluid, no T.B.; numerous cells, leucocytes and large mononuclears).
H. 133. "P.K." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3449.	27 days	0·1 mg.	2329	1,000	1,320	Killed 106 days	The lungs contained about a dozen caseous gritty miliary tubercles. The calyces of the left kidney were full of caseo-pus, the medulla showed several firm reddish streaks containing caseous foci, and there were scattered minute pits on the surface; the right kidney was similar.
			0·1 mg.	2328	1,000	1,170	Killed 106 days	Slight tuberculosis of lungs, kidneys, right eye, and lachrymal glands. The lungs were crepitant; the thin margins nearly all round were solid and caseating, and elsewhere, chiefly on the dorsal surfaces of the caudal lobes, there were scattered caseating nodules with grey margins up to 2·5 mm. in diameter. The left kidney showed minute pits, two depressed scars with caseating tubercles and a wedge-shaped caseous nodule with grey margins. The right kidney showed numerous small pits, two grey patches containing caseous tubercles, and an isolated caseous tubercle. In the iris of the right eye there were numerous grey foci and a caseous tubercle, and each lachrymal gland showed two caseating nodules.
			0·01 mg.	2327	1,050	1,850	Killed 106 days	The lungs showed in the thin margins a few grey patches containing minute caseous foci or streaks and elsewhere a few small grey tubercles. Each kidney showed a few minute pits or scars on the surface, and the calyces of the right were filled with caseo-pus.
		58 days	1·0 mg.	2360	1,350	820	Died 69 days	Tuberculosis of lungs and kidneys and one portal gland. The anterior lobes of the lungs were solid and caseating almost throughout; the caudal lobes showed on the dorsal surface and around the margins layers or bands of caseating tissue; elsewhere a moderate number of discrete caseous tubercles was seen. There were numerous pits and scattered caseous tubercles on the surface of each kidney, and a moderate number of caseous tubercles in the medulla of each. The portal gland contained caseous tubercles.

RABBITS INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN—*continued.*

SLIGHTLY VIRULENT VIRUSES—*continued.*

INTRAVENOUS INOCULATIONS—*continued.*

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Number of Rabbit.	Weight in Grammes.		Duration of Life.	Result.
					Initial.	Final.		
H. 133. "P.K."—*continued.*	Human sputum through G.P. 3449.	58 days	0·1 mg.	**2358**	1,400	2,100	Killed 103 days	The lungs contained sparsely scattered calcareo-caseous tubercles; there were numerous pits on the surfaces of the kidneys, a few grey tubercles and one caseous and softened nodule in the cortices and a caseous streak or two in the medullae.
			0·1 mg.	**2359**	1,500	1,000	Died 20 days	Early general tuberculosis. The lungs were crepitant and slightly congested; they contained moderately numerous submiliary grey tubercles, a few with opaque centres. The bronchial glands showed early caseation in the cortices. The liver contained a moderate number of minute greyish foci; the spleen was much enlarged and the Malpighian bodies were enlarged; the kidneys contained a moderate number of grey tubercles, a few with caseous centres. The lymphatic glands generally were enlarged.
H. 134. "K.K." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3489.	32 days	0·1 mg.	**2226**	2,150	1,100	Died 57 days	Slight general tuberculosis insufficient to account for death. There were flat caseating nodules and tubercles on the dorsal surfaces of the caudal lobes, and the edges of the thin margins of the lungs were grey and caseating. The kidneys were extensively scarred and showed small scattered tubercles; in one there was a larger wedge-shaped nodule. There were scattered tubercles in the areolar tissues of the groin and axilla, on the mesentery and on the costal pleura. The axillary inguinal and portal glands contained caseous tubercles.
			0·01 mg.	**2227**	3,100	2,370	Died 34 days	Death was due to cellulitis. The lungs showed on the surface scattered miliary tubercles with caseous centres, and near the posterior tips a few larger caseous nodules. There was no tuberculosis elsewhere.
H. 135. "E.E." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3491.	28 days	0·1 mg.	**2230**	2,470	2,520	Killed 113 days	Chronic general tuberculosis. The lungs showed around the margins a broad zone of tuberculous tissue, grey and infiltrated with caseous foci and streaks; there were several caseous and softened nodules on the dorsal borders of one lung, and elsewhere a few grey tubercles. Each kidney contained a few tubercles with caseous centres, and one showed also two caseous and softened nodules. Some of the alveoli and ducts of the mammary glands contained caseo-pus. The iris of one eye showed two caseous tubercles, and there were many caseous nodules in the lachrymal glands. An inguinal gland on each side was caseous and softened, and the portal gland contained a few caseous foci.
			0·01 mg.	**2231**	2,450	2,950	Killed 113 days	There was one miliary caseous tubercle in one kidney, a few doubtful grey foci in the lungs, and no sign of tuberculosis elsewhere.

H. 136. "X.B." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3522.	36 days	0·1 mg.	**2296**	1,100	870	Died 16 days	Tuberculosis of lungs only. The lungs were diffusely consolidated, more than three-quarters of the substance being composed of reddish-grey airless tissue ; everywhere in the lungs there were moderately numerous submiliary grey tubercles. The liver showed some minute grey points and the spleen was slightly enlarged.
			0·01 mg.	**2295**	1,500	1,200	Died 50 days	Slight generalised tuberculosis ; the cause of death was not apparent. The lungs showed scattered grey and whitish tubercles, larger and more numerous in the posterior parts of the caudal lobes than elsewhere. The liver contained a moderate number of greyish-white tubercles, the spleen a few ; in the kidneys there were a few grey tubercles with caseous centres. The portal gland showed caseous foci ; the bronchial glands were enlarged but not caseous. Smears from the spleen and liver tubercles showed each a few T.B.
H. 137. "O.B." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3524.	27 days	0·1 mg.	**2275**	1,300	1,850	Killed 126 days	There were one or two caseous tubercles in the medulla of each kidney and a few small pits on the surfaces. No tuberculosis elsewhere.
			0·01 mg.	**2274**	1,600	2,650	Killed 126 days	On the dorsal surface of one caudal lobe was a group of caseous tubercles with grey margins, elsewhere in the lung were scattered tubercles, mostly grey, some caseous in the centre. There were a few small pits on the surface of each kidney, and no sign of tuberculosis elsewhere.
H. 138. "C.C." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3526.	25 days	0·1 mg.	**2259**	1,450	1,800	Killed 124 days	On the dorsal surface of the right lung there was a superficial grey patch containing caseous foci, at the tip of the left lung was a similar smaller patch ; elsewhere a few small tubercles were seen. There were scattered minute calcareous tubercles in the spleen. Each kidney contained a grey nodule with caseous foci, and one showed also a projecting nail-shaped caseous and softened nodule which penetrated nearly to the apex of the papilla.
			0·01 mg.	**2258**	1,700	2,300	Killed 124 days	On the dorsal surface of the right lung there was a large superficial grey patch beset with caseous or caseo-calcareous foci ; elsewhere on the surface and in the thin margins were similar smaller patches ; no tubercles were seen on section. There was a caseous streak in the substance of one kidney ; two tubercles were seen on the peritoneum ; there was no tuberculosis elsewhere.
H. 139. "K.H." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3529.	25 days	0·1 mg.	**2263**	1,500	1,550	Died 16 days	Early general tuberculosis ; death from rupture of spleen. The lungs were crepitant and showed a moderate number of minute grey tubercles. The liver showed a moderate number of greyish foci ; the spleen was enlarged and ruptured, and speckled with grey points ; the kidneys showed numerous grey foci in the cortices. The lymphatic glands were normal.
			0·01 mg.	**2262**	1,500	2,600	Killed 124 days	The lungs showed on the surface scattered grey nodules with minute caseous foci ; none was seen on section. The kidneys showed a few scars on the surfaces ; each contained a grey nodule, and one two or three small tubercles also. There was no tuberculosis elsewhere.
H. 140. "J.J." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3607.	28 days	0·1 mg.	**2317**	1,500	1,250	Died 22 days	General tuberculosis. The lungs were crepitant and contained numerous minute translucent grey tubercles, a few with opaque centres. The liver showed on the surface numerous minute grey points, and on the surface and on section there were a few small greyish-white tubercles ; a smear from one showed a few T.B. The bronchial glands were slightly enlarged and showed patches of early caseation. Each kidney showed a moderate number of translucent grey tubercles a few with opaque centres. The spleen was slightly enlarged and showed moderately numerous minute grey points on the surface (smear, a few T.B.). One portal gland contained two miliary caseous tubercles.

RABBITS INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN—*continued.*

SLIGHTLY VIRULENT VIRUSES—*continued.*

INTRAVENOUS INOCULATIONS—*continued.*

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Number of Rabbit.	Weight in Grammes.		Duration of Life.	Result.
					Initial.	Final.		
H. 140. "J.J."—*continued.*	Human sputum through G.P. 3607.	28 days	0·01 mg.	**2316**	1,800	2,300	Killed 110 days	The lungs showed on the surface half-a-dozen flat grey nodules with a few caseous foci (up to 5 mm.) and a few small tubercles. There were a few minute pits on the surface of each kidney and a grey tubercle in the cortex of one. No tuberculosis elsewhere.
H. 141. "C.H." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3532.	27 days	0·1 mg.	**2279**	1,400	1,600	Killed 127 days	The lungs showed in the thin margins grey patches with caseous foci, and elsewhere scattered grey tubercles up to a millet-seed, the larger with caseous gritty centres. There were scattered caseous miliary tubercles in the cortex and one wedge-shaped caseous gritty nodule in the medulla of each kidney.
			0·01 mg.	**2278**	1,600	1,200	Died 45 days	The cause of death was not apparent. The lungs contained about 30 tubercles with caseous centres up to a millet-seed in size, and there were scattered greyish miliary tubercles in each kidney.
H. 142. "Q.H." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3534.	28 days	0·1 mg.	**2267**	1,370	1,800	Killed 125 days	Tuberculosis of lungs, kidneys, and a lachrymal gland. The right lung showed on the dorsal surface a group of tubercles with caseous or calcareous centres, and elsewhere on the surface of the lungs a few grey tubercles with opaque centres were seen. The kidneys showed a good many small pits on the surfaces; in the cortex of one there were three tubercles with caseous centres, one of which continued into the medulla and there expanded into a large grey caseating nodule; one calyx of the other kidney contained caseo-pus. One lachrymal gland contained a caseous nodule.
			0·01 mg.	**2266**	1,650	2,000	Killed 125 days	Tuberculosis of lungs, kidneys, one eye, and a lachrymal gland. On the dorsal surface of one caudal lobe of the lungs there was a large patch composed of aggregated calcareo-caseous nodules and grey nodules; on the dorsal surface of the other caudal lobe there was a group of similar nodules. Elsewhere on the surface of the lungs sparsely scattered grey tubercles were seen. Each kidney showed on the surface many small pits and a projecting nodule which on section was nail-shaped and showed caseous streaks. The iris of the left eye showed numerous grey tubercles, and there was a caseous nodule in the left lachrymal gland.
H. 143. "L.L." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3536.	28 days	0·1 mg.	**2283**	1,600	1,000	Died 37 days	Death from cellulitis. The lungs and kidneys contained scattered grey tubercles; there was no tuberculosis elsewhere.
			0·01 mg.	**2282**	1,450	2,450	Killed 126 days	Slight generalised tuberculosis (apparently progressive on pleura). The lungs contained scattered evenly distributed caseous miliary tubercles with grey margins; there were two or three small caseous flakes loosely attached to the thin margins of the lung. On the parietal pleura there were two clusters of small flattened caseating nodules (smear, no T.B.) and a few grey tubercles, and on the diaphragm and on the dorsal and ventral mediastinal pleural there were thin caseating plaques. In the cortex of the right kidney ten grey nodules (up to 2.5 mm.), the larger with caseous

								centres were seen ; two projected from the surface (a smear from one showed no T.B.). Nodules, similar but smaller in number and size, were seen in the cortex of the left kidney. The spleen contained a few minute calcareous foci. Cultures obtained from the lung and a pleural growth were dysgonic and highly virulent for the rabbit.
H. 144. "D.B." *(Tuberculosis of the lung.)*	Human sputum through G.P. 3614.	33 days	0·1 mg.	**2333**	1,150	1,400	Killed 107 days	Slight tuberculosis of lungs, kidneys, and lachrymal glands. In the thin margins of the lungs there were grey patches with caseous foci, and on the dorsal surface of one lung two superficial grey caseating patches ; elsewhere in the lungs miliary caseous tubercles with grey margins were seen. Scattered pits and grey tubercles, some caseous, were seen on the surface of each kidney, and a few caseous streaks and tubercles on section ; the pelvis of one kidney contained caseo-pus. One lachrymal gland contained five caseous nodules up to a pea in size, the other two small nodules.
			0·01 mg.	**2332**	1,300	1,520	Killed 107 days	Slight tuberculosis of lungs, kidneys, and a lachrymal gland. The lungs showed mainly on the surface a moderate number of irregular grey nodules centrally caseous ranging up to 5 mm. in diameter ; there was also one larger nodule on the surface of a caudal lobe. There were a few minute pits and a grey tubercle or two on the surface, and a few caseous gritty tubercles in the medulla, of each kidney. One lachrymal gland contained a caseous and softened nodule.
H. 145. "G.W." *(Tuberculosis of the lung.)*	Human sputum through G.P. 3540.	28 days	0·1 mg.	**2287**	1,350	1,800	Killed 127 days	Slight tuberculosis of lungs, kidneys, and lachrymal glands. The lungs showed in the thin margins a small grey patch or two containing caseous foci and two caseo-calcareous tubercles ; the rest of the lung was normal except for a small grey tubercle or two. Each kidney showed in the cortex scattered grey miliary tubercles with caseous centres, and in one two or three caseating streaks and a large softened caseous nodule were also seen. Each lachrymal gland contained a nodule, one softened, the other grey and caseating ; a smear from the former showed T.B. in moderate numbers.
			0·01 mg.	**2286**	1,550	1,020	Died 92 days	Slight tuberculosis of lungs, kidneys, and spleen. The cause of death was not apparent. The lungs showed on the surface scattered miliary tubercles with caseous centres, and flat nodules, two of which were caseous softened and gritty the rest grey with caseous foci. There were several small scars on the surface of each kidney ; one contained an elongated caseous tubercle, the other three grey tubercles with caseous centres. The spleen contained a few yellow caseous miliary tubercles.
INTRAPERITONEAL INOCULATIONS.								
H. 67. "E.P." *(Multiple tuberculosis of bones.)*	Pus from scapular abscess through G.P. 1914.	108 days	10·0 mg.	**959**	3,050	2,150	Killed 126 days	The omentum contained thin-walled cheesy nodules, and scattered tubercles were seen on the peritoneum. The surfaces of the kidneys showed a number of depressed scars some containing a caseating nodule ; in the medullae caseous streaks and tubercles were seen ; many of the calyces of the right were distended with pus. There were about six small grey tubercles in the lungs.
			1·0 mg.	**960**	2,960	3,480	Killed 126 days	The omentum contained fairly numerous pinhead tubercles, and there were sparsely scattered tubercles on the peritoneum. Each kidney showed three or four small yellow tubercles in the medulla and one had also a caseous streak. Three or four grey tubercles were seen in the lungs. There were several caseating nodules on the meso-testis.

RABBITS INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN—*continued.*

SLIGHTLY VIRULENT VIRUSES—*continued.*

INTRAPERITONEAL INOCULATIONS—*continued.*

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Number of Rabbit.	Weight in Grammes.		Duration of Life.	Result.
					Initial.	Final.		
H. 68. "R.B." (*Tuberculosis of the sacrum.*)	Pus from sacral abscess.	190 days	10·0 mg.	**986**	2,050	2,100	Killed 124 days	There was very slight tuberculous peritonitis. Both testicles were enlarged and caseating. In the medulla of each kidney there were many caseating streaks and the pelvis of the left was filled with caseo-pus. The lungs (crepitant) showed a moderate number of small tubercles and some fibro-caseous patches in the thin margins. The sternal glands contained caseous patches.
			1·0 mg.	**987**	1,700	2,850	Killed 124 days	There was very slight tuberculous peritonitis. In the left kidney there were several caseous tubercles and a wedge-shaped caseous nodule; the right contained one caseous tubercle. The liver showed two greyish white tubercles (no T.B.). The lungs contained a few grey tubercles, a soft thin-walled caseous nodule and a few fibro-caseous areas in the thin margins.
H. 70. "N.W." (*Primary abdominal tuberculosis.*)	Human cervical glands through G.P. 1933.	62 days	1·0 mg.	**999**	1,550	1,300	Killed 188 days	There was slight tuberculous peritonitis. Each kidney contained scattered miliary tubercles, and the pelves were distended with caseo-pus; both showed numerous pitted scars on the surface. The lungs contained scattered miliary tubercles, a group of thin-walled soft caseous nodules in the tip of each caudal lobe, and patches of grey caseating tissue in the thin margins.
	Human mesenteric gland through G.P. 1928.	50 days	10·0 mg.	**969**	1,700	1,470	Killed 140 days	There was slight tuberculous peritonitis. In each kidney several caseous streaks and a few caseous foci were seen and one calyx of the right contained caseo-pus; on the surfaces there were irregular scars some containing caseous foci. The lungs contained grey tubercles, not very numerous, and two peasized caseous nodules in the left caudal tip. The injection was partly intracoecal.
			1·0 mg.	**970**	1,390	1,420	Killed 140 days	General tuberculosis. There was rather severe tuberculous peritonitis. The testicles were beset with caseous tubercles, and the epididymes caseous throughout. The kidneys showed scars and caseous tubercles on the surface and the usual caseous streaks and foci in the medullae. The lungs (crepitant) showed fairly numerous grey tubercles with caseous centres; these were confluent in places along the thin margins.
	Human bronchial gland.	140 days	10·0 mg.	**975**	1,740	1,600	Died 14 days	Early general tuberculosis: the immediate cause of death was not apparent. There was early tuberculous peritonitis. The spleen was greatly enlarged, firm and dark red. The lungs were crepitant; numerous minute grey tubercles were visible. The blood was thin and watery. In the marrow of the femur and in the spleen T.B. were fairly numerous; none was seen in the blood.
			1·0 mg.	**976**	2,200	2,000	Killed 183 days	Chronic general tuberculosis. Calcareous or caseous tubercles were scattered over the peritoneal tissues. There were caseous streaks and foci and a few grey nodules with caseous points in the kidneys, and the pelves were distended with caseo-pus. On the surfaces large depressed scars were seen. The lungs (crepitant) showed scattered grey tubercles, and caseous and calcareous nodules in the tips of the caudal lobes.

H. 72. "H.C." *(Tuberculosis of a rib.)*	Pus from abscess of rib through G.P. 1945.	82 days	10·0 mg.	1008	2,280	2,600	Killed 183 days	Chronic general tuberculosis. There was tuberculous peritonitis of a chronic type. The right kidney showed on the surface projecting caseous nodules, the left a few tubercles and streaks in the medulla, and the pelves were full of pus. The lungs contained a small number of greyish-red nodules beset with caseous points (chiefly in the thin margins) and one peasized soft caseous nodule. There were a few caseo-calcareous tubercles in the bronchial glands.
H. 74. "D.S." *(Primary abdominal tuberculosis.)*	Human mesenteric gland.	77 days	10·0 mg.	1152	600	600	Died 55 days	Slight general tuberculosis. The cause of death was not apparent. Fairly numerous caseous tubercles were seen on the mesentery mesocolon and omentum, and the latter also showed bands of caseating tissue. There were one or two small tubercles in each kidney and about half a dozen in the lungs. One of the coeliac glands was caseous.
			1·0 mg.	1155	750	750	Died 141 days	Chronic general tuberculosis. There was tuberculous peritonitis not severe and of a chronic type. The kidneys showed not very numerous caseous tubercles and streaks of the usual type; the calyces of the left were distended with caseo-pus, as were also the uterus and Fallopian tubes. Two small tubercles were seen in the lungs. There were a few small soft caseous nodules lying on the ribs, one under the periosteum of the tibia, and one under the fascia of a muscle.
	Human lung through G.P. 2004.	63 days	10·0 mg.	1185	780	1,150	Killed 126 days	In the muscle wall of the abdomen there were a thin-walled cystic tumour and numerous discrete miliary tubercles, and on the mesentery mesocolon and omentum not very numerous calcareous tubercles; the latter also showed a few caseo-purulent nodules. The kidneys contained a moderate number of miliary tubercles and a few caseo-purulent nodules and streaks; the pelvis of the right was filled with caseo-pus. The lungs showed sparsely scattered small grey nodules with caseous centres.
			1·0 mg.	1186	860	1,320	Killed 126 days	There were a few calcareous tubercles on the omentum and peritoneum. The kidneys showed a few grey tubercles and here and there a soft yellow tubercle; one calyx of the left contained caseo-pus. The lungs showed a number of irregular greyish-red patches infiltrated with caseous foci situated chiefly on the surface and in the thin margins.
	Human bronchial gland.	77 days	10·0 mg.	1148	600	550	Died 23 days	General tuberculosis. There was a rather large caseating tumour in the subcutaneous tissues of the abdominal wall; on the peritoneal tissues numerous grey points were just visible, and bands of caseating tissue were seen on the omentum. There were fairly numerous minute grey foci in the liver and kidneys, and doubtful points in the slightly enlarged spleen. The portal and coeliac glands were in an early state of caseation and the bronchial glands showed caseous foci. The lungs appeared normal.
			1·0 mg.	1149	700	950	Died 67 days	Slight tuberculosis. Death was due to an intercurrent infection. A small caseous softened mass was found in the subcutaneous tissues at the seat of inoculation. There was tuberculous peritonitis, not severe. The kidneys showed a few grey nodules and tubercles with caseous centres and in the left a long caseous streak also; there were one or two minute tubercles in the lungs. One coeliac gland contained a small caseo-calcareous nodule.
	Human spleen	86 days	10·0 mg.	1171	1,500	900	Died 35 days	There was slight tuberculous peritonitis. A few minute grey tubercles were just visible in the caudal lobes of the lung which were crepitant throughout. There was a small quantity of fibrinous exudate in the pericardial sac (no T.B. or other micro-organisms seen). The cause of death was not determined.

RABBITS INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN—*continued.*

SLIGHTLY VIRULENT VIRUSES—*continued.*

INTRAPERITONEAL INOCULATIONS—*continued*

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Number of Rabbit.	Weight in Grammes.		Duration of Life.	Result.
					Initial.	Final.		
H. 75. "A.H." (*Primary abdominal tuberculosis.*)	Human peritoneal fluid through G.P. 2018.	99 days	10·0 mg.	**1207**	2,100	1,250	Died 92 days	General tuberculosis. There were moderately numerous miliary tubercles with caseous centres on the peritoneum, and tubercles of various sizes on the omentum. The kidneys showed small scattered caseous tubercles and several caseous streaks. The lungs were almost entirely composed of irregular firm caseating masses; a few small islands of congested lung tissue alone remained. T.B. were numerous in an emulsion made from the lung.
H. 78. "O.D." (*General tuberculosis probably primary in cervical glands.*)	Human lung through G.P. 2123.	60 days	10·0 mg.	**1197**	1,550	2,450	Killed 141 days	There was a small fibrous nodule with a central cavity lined with caseous tissue in the subcutaneous tissues of the abdominal wall, and a small caseous nodule was seen in the wall of the stomach; the peritoneum was normal. The lungs showed sparsely scattered greyish-red nodules containing caseous foci. The inoculation was probably almost entirely intrastomachic.
		"	1·0 mg.	**1198**	1,200	2,000	Killed 141 days	There were a few minute tubercles on the omentum—none on the peritoneum. In the cortex of each kidney a few small tubercles were seen. The surface of the right lung was to a large extent covered with firm grey nodules and patches composed of greyish-red tissue speckled with caseous foci; the nodules were much less numerous on section; the left lung was similarly but less severely affected.
	Human bronchial gland.	98 days	10·0 mg.	**1217**	970	680	Died 28 days	General tuberculosis. The peritoneum showed fairly numerous minute greyish tubercles and the omentum was thickened. The kidneys contained fairly numerous small grey tubercles, as also did the lungs, which were crepitant. The liver was speckled with grey points (a few T.B. and ? other organisms were seen in a smear from the organ). There were scattered caseous foci in the bronchial and many abdominal glands, and one coeliac gland showed early caseation.
	Human meninges through G.P. 2122.	77 days	10·0 mg.	**1213**	950	650	Died 20 days	General tuberculosis. There was early tuberculous peritonitis. The liver and kidneys showed numerous minute grey foci. The ventral margins of the anterior lobes of the lungs were collapsed and contained very minute transparent tubercles; the rest of the lungs was healthy. The bronchial portal and coeliac glands contained one or two caseous tubercles each. No T.B. were seen in smears from the liver and spleen.
H. 79. "J.N." (*Tuberculosis of lung.*)	Human lung	85 days	10·0 mg.	**1223**	1,850	1,750	Died 12 days	Early general tuberculosis. There was early tuberculosis of peritoneum and omentum. The spleen was much enlarged and soft (numerous T.B.). The liver showed many opaque tubercles on the surface only. Numerous very small grey tubercles were seen on the surface of the lung (some also on section), and the bronchial glands were much enlarged, soft and showed caseous points on section. The

								sternal gland was enlarged and firm and contained a caseating patch. T.B. were numerous in a scraping from the sternal gland and were seen in a crushed tubercle from the liver and in a scraping from the lung: the latter showed also (?) pseudo-tubercle bacilli.
H. 80. "D.M." (*Tuberculosis of lung.*)	Human lung	81 days	10·0 mg.	1257	1,120	1,170	Died 247 days	Chronic general tuberculosis. In the omentum there were a calcareo-caseous tumour (1 cm.) and calcareous miliary tubercles, on the mesentery caseo-calcareous masses, on the mesotestis numerous miliary caseous tubercles, and on the peritoneum in the dorsal regions caseo-calcareous tubercles. The posterior parts of the caudal lobes of the lungs were replaced by cheesy gritty caseous masses and there was a narrow band of similar tissue in the thin margins; elsewhere in the lungs, which were crepitant, were fairly numerous irregular firm caseous nodules with grey margins. Projecting from the surfaces of the kidneys were fairly numerous grey nodules showing caseous foci—which penetrated the substance as caseous streaks—and numerous pits and scars; the pelves were filled with caseo-pus. The spleen was atrophied; the liver contained two or three tubercles. Beneath the capsule of one testis there was a caseous nodule. On the inside of each tibia head was a small collection of caseo-pus. One lachrymal gland was cheesy and gritty throughout. the other contained a cheesy nodule. Under the fascia of the muscles of the back were several collections of caseo-pus. Smears from the liver and the pus from the tibia showed each a few T.B.
H. 81. "P.W." (*Tuberculosis of lung.*)	Human lung	72 days	10·0 mg.	1253	1,200	1,850	Killed 161 days	Chronic general tuberculosis, not severe. There was tuberculous peritonitis of a chronic type. In one calyx of each kidney caseo-pus was found; one showed a few greyish nodules in the cortex and medulla, the other scattered soft caseous tubercles in the medulla only; the surfaces of both showed depressed scars. The lungs were rather closely beset with discrete greyish-red nodules up to a hempseed in size, the majority with caseous foci in their centres.
H. 82. "G.F." (*General tuberculosis primary in the alimentary tract.*)	Human lung through G.P. 2242.	81 days	10·0 mg.	1303	1,700	1,000	Died 22 days	Early general tuberculosis. with pseudo-tuberculosis. The omentum was slightly thickened and showed some early caseous streaks, and contained also a dozen cysticerci. The peritoneum presented fairly numerous minute grey tubercles. The lungs collapsed normally and contained a moderate number of just visible grey points (early tubercles). The kidneys showed on the surface scattered grey foci (? tubercles). There was pseudo-tuberculosis of the spleen and mesenteric glands.
H. 83. "G.C." (*General tuberculosis primary in the alimentary tract.*)	Human mesenteric gland.	95 days	10·0 mg.	1309	1,200	750	Died 16 days	Death from pseudo-tuberculosis of the mesenteric glands. The omentum was slightly thickened and showed a few grey tubercles, and there were a few minute grey points on the mesentery and mesocolon.
	Human bronchial gland.	95 days	10·0 mg.	1314	1,600	1,410	Died 5 days	Death from gastritis.
H. 86. "C.P." (*Tuberculosis primary in the lung.*)	Human meninges through G.P. 2395.	57 days	10·0 mg.	1386	1,370	2,320	Killed 220 days	Slight tuberculosis of peritoneum and omentum. The lung showed a few calcareous tubercles, and half-a-dozen caseo-calcareous nodules in the thin margins. Each kidney showed a few scars on the surface and caseous streaks and foci in the medulla; the calyces of the right were full of caseo-pus, and there was a small quantity in the left. The epididymes contained softened caseo-purulent areas.

RABBITS INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN—*continued.*

SLIGHTLY VIRULENT VIRUSES—*continued.*

INTRAPERITONEAL INOCULATIONS—*continued.*

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Number of Rabbit.	Weight in Grammes.		Duration of Life.	Result
					Initial.	Final.		
H. 86. "C.P."—*continued.*	Human meninges through G.P. 2395.	57 days	1·0 mg.	**1387**	1,150	2,750	Killed 221 days	There was a small muco-purulent cyst in the muscle wall at the seat of inoculation. There were scattered calcareous tubercles on the omentum, mesentery, and meso-colon. The lungs contained a few caseous tubercles with grey margins. One kidney showed a depressed scar, extending inwards from which was a fibrous wedge with a caseous focus at the tip.
H. 87. "W.D." (*Tuberculosis of the suprarenal bodies.*)	Human suprarenal through a guinea-pig.	56 days	10·0 mg.	**1344**	1,090	2,800	Killed 152 days	In the omentum only half-a-dozen minute tubercles were seen; in the lung there was a single small grey nodule; otherwise the body was normal. Most of the culture was probably injected into the colon, though there was no sign of injury in the wall of the gut.
			1·0 mg.	**1345**	1,140	830	Died 12 days	The omentum contained fairly numerous grey caseating tubercles and there was a fair number of minute grey points on the mesentery and meso-colon; there was no sign of disease elsewhere.

SUBCUTANEOUS INOCULATIONS.

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Number of Rabbit.	Weight in Grammes.		Duration of Life.	Result
					Initial.	Final.		
H. 67. "E.P." (*Multiple tuberculosis of bones.*)	Pus from scapular abscess through G.P. 1914.	108 days	10·0 mg.	**961**	2,620	3,170	Killed 126 days	At the seat of inoculation there was a cyst the size of an orange containing yellow purulent fluid. The adjacent glands were normal. In the lung there was a soft caseous nodule, a few minute tubercles, and a grey patch containing caseous foci.
			1·0 mg.	**962**	2,870	4,020	Killed 126 days	At the seat of inoculation there was a cyst the size of a goose's egg filled with caseo-pus; the adjacent glands were normal. In the lung there was one gritty caseous nodule and three small grey tubercles.
H. 68. "R.B." (*Tuberculosis of the sacrum.*)	Pus from sacral abscess.	190 days	50·0 mg.	**988**	1,650	1,150	Died 10 days	Death was apparently due to biliary cirrhosis. At the seat of inoculation there was a collection of caseo-pus. The axillary glands were enlarged and congested. The kidneys were speckled with minute grey points (? tubercles).
			10·0 mg.	**989**	2,600	3,100	Killed 124 days	Small fibroid patch enclosing caseo-pus at seat of inoculation. The adjacent gland was composed of soft caseous nodules set in fibroid tissue. The lungs contained about two dozen grey nodules, the majority showing minute caseous points. In the right kidney there was a single tubercle; the surface showed a depressed scar.
H. 70. "N.W." (*Primary abdominal tuberculosis.*)	Human cervical glands through G.P. 1933.	62 days	10·0 mg.	**1001**	1,550	2,900	Killed 188 days	At the seat of inoculation there was a group of large caseo-purulent nodules and the overlying skin was adherent and ulcerated; each axillary gland showed a large softened caseous patch. The lungs contained half a dozen miliary tubercles, a group of small caseous nodules in the tip of a caudal lobe, and a caseating mass occupying the tip of a cephalic lobe.

	Human mesenteric glands through G.P. 1928.	50 days	10·0 mg.	971	1,800	2,620	Killed 140 days	At the seat of inoculation there was a fibroid scar. In the right kidney there were two small tubercles; two small caseous nodules projected from the surface of the left and extended deeply into the cortex; the pelvis of the left contained some caseo-pus. The lungs contained a few tubercles and a caseous mass (1 cm.) in the tip of a caudal lobe. On the pleura there were several small groups of tubercles.
			1·0 mg.	972	1,600	2.050	Killed 140 days	The local tumour was a thin-walled cyst filled with caseo-pus. The adjacent glands were enlarged, otherwise normal. Each kidney contained two or three small tubercles, and the lungs showed sparsely scattered small grey nodules.
	Human lung	141 days	10·0 mg.	981	2,980	2,500	Killed 170 days	Small caseous local lesion. Adjacent glands normal. In the left kidney there was a single tubercle.
			1·0 mg.	982	1,860	3,500	Killed 170 days	Large cystic local tumour containing turbid serous fluid and caseous flakes. The adjacent glands were normal. The lungs contained half a dozen scattered grey miliary tubercles, and two groups of small tubercles with caseous centres.
	Human bronchial gland.	140 days	10·0 mg.	977	2,140	3,250	Killed 183 days	There was no local lesion. Two soft caseous tubercles were seen in the lungs.
			1·0 mg.	978	2,020	2,750	Killed 183 days	The local tumour was cystic (the size of a pigeon's egg), and contained caseo-pus. The adjacent glands were normal. The lungs showed one soft caseous nodule and two grey tubercles.
H. 72. "H.C." (*Tuberculosis of a rib.*)	Pus from abscess of rib through G.P. 1945.	82 days	50·0 mg.	1006	1,510	1,900	Died 183 days	Death was due to injuries. The local lesion consisted of a group of thin-walled caseous nodules, and one axillary gland contained a caseous tubercle. In the tip of one caudal lobe there were three softened caseous nodules, and in the rest of the lung two minute grey tubercles.
			10·0 mg.	1007	1,600	2,950	Killed 183 days	The local tumour consisted of a thin-walled cyst with caseo-purulent contents. Nodules of various sizes up to a pea, the larger caseous and softened, were sparsely scattered throughout the lungs.
H. 74. "D.S." (*Primary abdominal tuberculosis.*)	Human mesenteric gland.	77 days	20·0 mg.	1156	650	1,430	Killed 141 days	The local lesion consisted of a number of confluent caseo-purulent nodules; in the adjacent gland there was a small nodule containing turbid fluid and calcareous grains. Three caseating nodules and one calcareous tubercle were seen in the lungs, and a few small tubercles in each kidney.
			10·0 mg.	1157	500	1,530	Killed 141 days	There was a small thin-walled cyst with caseo-purulent contents at the seat of inoculation, and the adjacent axillary gland was enlarged, caseous and softened throughout. Each kidney contained one or two tubercles, and the lungs showed two small groups of miliary caseo-calcareous tubercles.
		120 days	50·0 mg.	1210	1,320	2,520	Killed 112 days	At the seat of inoculation there was a thin-walled cyst the size of an orange filled with caseo-pus. The adjacent axillary gland was slightly enlarged but not caseous. The lungs (crepitant) contained fairly numerous grey miliary tubercles with caseous gritty centres, here and there aggregated together.
	Human lung through G.P. 2004.	63 days	10·0 mg.	1187	550	790	Died 109 days	The local lesion consisted of a group of large thin-walled caseous and softened nodules; the overlying skin was ulcerated; in the adjacent axillary gland there were two caseo-calcareous tubercles. The lungs contained three caseous nodules. The spleen was very small and apparently atrophied.
		90 days	10·0 mg.	1209	1,120	2,900	Killed 112 days	The local lesion consisted of a series of large caseo-purulent nodules aggregated together. There was no tuberculosis elsewhere.
	Human bronchial gland.	77 days	50·0 mg.	1150	650	620	Died 31 days	At the seat of inoculation there was a large excavated ulcer evidently produced by companion rabbits eating out the local lesion. The axillary glands contained irregular caseous patches, and there were two or three small grey tubercles in the lungs. Death was apparently due to injuries received.

RABBITS INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN—*continued.*

SLIGHTLY VIRULENT VIRUSES—*continued.*

Subcutaneous Inoculations—*continued.*

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Number of Rabbit.	Weight in Grammes.		Duration of Life.	Result.
					Initial.	Final.		
H. 74. "D.S."—*continued.*	Human bronchial gland.	77 days	10·0 mg.	**1151**	650	1,000	Died 50 days	At the seat of inoculation there was a large empty cavity lined internally with caseo-pus; in the overlying skin there were several small ulcers, through which the contents of the cyst had probably escaped. The adjacent gland contained a small caseous nodule. Death was due to causes other than tuberculosis.
	Human spleen	86 days	46·0 mg.	**1172**	1,300	1,670	Killed 133 days	The local lesion consisted of a group of three or four caseo-purulent nodules, the largest the size of a sparrow's egg. There was no tuberculosis elsewhere
H. 75. "A.H." (*Primary abdominal tuberculosis.*)	Human peritoneal fluid through G.P. 2018.	99 days	10·0 mg.	**1208**	1,850	2,510	Killed 101 days	The local lesion consisted of a series of caseo-purulent nodules aggregated together; the adjacent axillary glands were enlarged and contained three or four caseo-calcareous tubercles. The lungs showed a few grey miliary tubercles, some with caseous centres.
	Human lung through G.P. 2159.	47 days	10·0 mg.	**1433**	750	3,100	Killed 192 days	There was a large lobulated cyst containing thin pus with calcareous grains at the seat of inoculation, and in the adjacent scapular gland a calcareous grain; there were two grey tubercles in the lungs, and no tuberculosis elsewhere.
			10·0 mg.	**1434**	800	1,570	Killed 192 days	Slight chronic general tuberculosis. There was a very large lobulated cyst filled with caseo-pus; the adjacent glands were normal. The lungs were crepitant and contained fairly numerous irregular grey tubercles confluent mainly in the margins and forming grey patches without definite caseation. There were two or three tubercles in each kidney. On the peritoneal fold of the left epididymis there was a pea-sized nodule with caseo-purulent contents.
H. 76. "G.M." (*Tuberculosis of a kneejoint.*)	Human synovial membrane through G.P. 2887.	38 days	50·0 mg.	**1782**	3,100	4,200	Killed 175 days	There was a thin-walled cyst at the seat of inoculation filled with creamy caseo-pus. The lungs contained sparsely-scattered grey miliary tubercles with caseous centres and a few minute tubercles; there was a caseous nodule in the tip of one caudal lobe. One kidney showed on the surface a grey nodule containing a caseous focus and a minute tubercle, the other three miliary tubercles with caseous centres.
			10·0 mg.	**1783**	900	3,300	Killed 175 days	There was a large flaccid thin-walled cyst at the seat of inoculation the size of a large orange, filled with caseo-pus. The adjacent scapular gland contained a few calcareous grains. The lungs contained scattered fibrous nodules with caseous centres from 1 to 3 mm. in diameter. There was no tuberculosis elsewhere.
H. 78. "O.D." (*General tuberculosis probably primary in cervical glands.*)	Human lung through G.P. 2123.	60 days	10·0 mg.	**1199**	1,440	2,050	Killed 141 days	Local tuberculosis and tuberculosis of lungs. The local lesion consisted of a group of three or four large thin-walled cysts containing creamy caseo-pus; two small caseous nodules were seen in the adjacent axillary gland. More than half of the caudal lobe of the left lung

								was composed of caseating masses ; that of the right was similarly but less severely affected : the ventral margins of the cephalic lobes were tuberculous ; elsewhere in the lungs scattered caseous tubercles were seen.
	Human bronchial gland.	98 days	10·0 mg.	1218	920	2,400	Killed 140 days	There was a cystic tumour the size of a goose's egg at the seat of inoculation ; the scapular glands were enlarged and were practically cysts filled with a mucoid fluid containing some caseo-purulent substance. The lungs showed around the margins scattered greyish-red nodules and patches containing caseous foci, and elsewhere a few miliary caseous tubercles.
	Human meninges through G.P. 2122.	77 days	10·0 mg.	1214	750	2,200	Killed 188 days	At the seat of inoculation there was a thin-walled cystic tumour filled with caseo-pus, and in the adjacent scapular gland a cyst containing watery fluid. In the lungs two small greyish-red nodules with caseous points were found.
H. 79. "J.N." (*Tuberculosis of lung.*)	Human lung	85 days	10·0 mg.	1224	1,350	2,020	Killed 185 days	Slight general tuberculosis. The local lesion consisted of an aggregation of softened caseous nodules, the skin over one of which was ulcerated. The adjacent right scapular gland was much enlarged and caseous almost throughout. The margins of the lungs were largely occupied by reddish-grey tissue beset with caseous foci ; the rest of the lungs showed sparsely scattered grey miliary tubercles. The kidneys contained a few tubercles, some grey others yellow and caseous ; the right showed in addition a few small scars on the surface.
H. 80. "D.M." (*Tuberculosis of lung.*)	Human lung	81 days	10·0 mg.	1258	1,120	3,400	Killed 725 days	There was no local lesion. Each scapular gland contained one or two calcareous grains ; on the surface of each kidney two or three small pitted scars were seen. The other glands and organs appeared normal. Emulsions of the scapular glands and of the lung produced severe general tuberculosis in guinea-pigs.
H. 81. "P.W." (*Tuberculosis of lung.*)	Human lung	72 days	10·0 mg.	1254	950	2,590	Killed 161 days	The local lesion consisted of a group of thin-walled caseo-purulent nodules. The adjacent scapular gland contained a small softened nodule. In the lungs there were a few grey nodules containing yellow or opaque foci and in the margin of a lobe one grey patch containing gritty foci.
H. 82. "G.F." (*General tuberculosis primary in the alimentary tract.*)	Human mesenteric glands through G.P. 2239.	87 days	10·0 mg.	1429	800	1,750	Killed 168 days	The local lesion consisted of aggregations of calcareous tubercles ; the nearest glands were normal. The lungs contained sparsely scattered grey tubercles, many with caseous centres. One kidney showed a caseous tubercle, the other a minute grey focus.
			1·0 mg.	1430	950	1,700	Killed 168 days	There was an empty cavity at the site of inoculation lined with granulation tissue. The nearest glands were normal. The lungs contained fairly numerous grey nodules with caseous gritty foci, mainly on the surface ; in one caudal lobe were two large caseous and softened nodules. Other organs and glands were normal.
	Human lung through G.P. 2242.	81 days	50·0 mg.	1304	1,240	720	Died 39 days	There was a large flat caseo-purulent patch surrounded by a thin fibrous capsule at the seat of inoculation, and the scapular glands contained caseous tubercles. Most of the right caudal lobe of the lung was occupied by friable caseous masses (smear, no T.B.) ; it was covered with a thin greyish-yellow membrane, and was slightly adherent to the pleura, which was congested and covered with a similar membrane. The condition of the lung was not apparently due to tuberculosis. The abdominal organs were normal.
			10·0 mg.	1305	1,150	1,900	Killed 117 days	In the back there was a contracted abscess cavity containing a little caseo-pus and communicating externally through a small opening. The adjacent scapular gland was enlarged, and contained soft caseous nodules. There was a greyish-red nodule (1 cm.) beset with caseous foci in the tip of each of two lobes ; elsewhere in the lung four similar but smaller nodules were seen.

RABBITS INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN—*continued.*

SLIGHTLY VIRULENT VIRUSES—*continued*

SUBCUTANEOUS INOCULATIONS—*continued.*

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Number of Rabbit.	Weight in Grammes.		Duration of Life.	Result.
					Initial.	Final.		
H. 83. "G.C." (*General tuberculosis primary in the alimentary tract.*)	Human mesenteric gland.	95 days	50·0 mg.	**1310**	1,250	820	Died 38 days	In the subcutaneous tissues of the back there was a tumour consisting of caseo-pus within a fibrous wall. The scapular glands, slightly enlarged, contained a few softened tubercles. There were one or two minute grey points in the lungs, and a single tubercle in the left kidney. The amount of disease was insufficient to account for death.
			42·0 mg.	**1311**	1,200	800	Died 38 days	There was a moderately large local tumour consisting of caseo-pus surrounded by firmer caseous substance. The scapular glands contained small caseous tubercles. There were a few small tubercles in the lungs; one kidney showed one minute tubercle, the other three. The amount of disease was insufficient to account for death.
	Human bronchial gland.	95 days	50·0 mg.	**1315**	1,700	3,000	Killed 126 days	There were a few caseous nodules up to a pea in size in the subcutaneous tissues of the back, and the right scapular gland showed several small cavities filled with caseo-pus. There was no tuberculosis elsewhere.
			50·0 mg.	**1316**	1,100	820	Died 25 days	There was a large ulcer at the seat of inoculation, and a flattened caseous and softening tumour in the underlying muscle. The enlarged scapular glands contained small caseous nodules. The lungs showed a few minute glassy tubercles. There was pseudo-tuberculosis of the intestine and mesenteric glands.
H. 86. "C.P." (*Tuberculosis primary in the lung.*)	Human meninges through G.P. 2395	57 days	50·0 mg.	**1388**	1,200	1,250	Died 206 days	Death was due to injuries. There was a thin-walled cyst the size of a pigeon's egg with caseo-purulent contents, and a few smaller nodules, between the muscles of the back. One right scapular gland contained a caseous tubercle. In the lungs three small softened caseous nodules were found.
			10·0 mg.	**1389**	1,450	3,800	Killed 220 days	There were several large thin-walled cysts in the subcutaneous tissues at the seat of inoculation, containing either caseo-pus, or cheesy masses with watery fluid. The scapular glands contained a few calcareous grains. There was no tuberculosis elsewhere.
H. 87. "W.D." (*Tuberculosis of the suprarenal bodies.*)	Human suprarenal through a guinea-pig	56 days	50·0 mg.	**1346**	1,070	840	Died 11 days	Death from psorospermosis of liver. In the subcutaneous tissues between the shoulders there was a softening caseous tumour; the left scapular gland was enlarged and contained a caseous nodule; a few minute grey tubercles were seen in the lungs.
			10·0 mg.	**1347**	1,170	770	Died 15 days	There was a soft caseous tumour in the subcutaneous tissues of the back, and the left scapular gland showed early caseation; there was no tuberculosis elsewhere, and the cause of death was not apparent.
	"	68 days	10·0 mg.	**1370**	1,200	2,850	Killed 148 days	There was a very small local lesion; the nearest glands were normal; one pinhead grey tubercle was seen in the lung.
			1·0 mg.	**1369**	1,300	2,200	Killed 148 days	No local lesion was found. The animal was free from tuberculosis.

H. 93. "C.D." (*General miliary tuberculosis.*)	Human lung through G.P. 2610	78 days	100·0 mg.	1640	790	750	Died 55 days	There was a large lobulated caseous local tumour the skin over which was in places ulcerated. The adjacent scapular gland contained four caseous tubercles. The lungs contained sparsely scattered pinhead-sized caseous tubercles with reddish margins; there was a single grey tubercle in one kidney. Other organs and glands were free from tubercles. The amount of disease was insufficient to account for death.
	Human lung through G.P. 2609.	78 days	50·0 mg.	1638	1,190	3,250	Killed 232 days	There was no local lesion and the glands near the seat of inoculation were normal. In the lung one firm caseating nodule the size of a hempseed was seen; there was no tuberculosis elsewhere.
			50·0 mg.	1639	1,140	3,100	Killed 232 days	There was a number of small cysts containing mucinous fluid or caseo-pus at the seat of inoculation. One caseous gritty tubercle was seen in the lung, and on the surfaces of the kidneys a number of minute pits; there was no sign of tuberculosis elsewhere.
	Acne spots through G.P. 2611.	89 days	50·0 mg.	1721	1,750	2,050	Killed 60 days	The local tumour was nodular, caseous and softened. The lungs contained half-a-dozen translucent grey tubercles and about half-a-dozen reddish-grey nodules with caseous centres (up to 2·5 mm.). There was no tuberculosis elsewhere.
			50·0 mg.	1722	1,650	2,360	Killed 192 days	There was a cyst the size of a bagatelle ball filled with thick caseo-pus at the seat of inoculation. In the caudal tip of one lung there was a caseous gritty nodule; elsewhere in the lungs were sparsely scattered small tubercles; a few had caseous centres, one was gritty, the rest were grey and homogeneous. There was no tuberculosis elsewhere.
			50·0 mg.	1723	1,250	1,030	Died 38 days	There was a flat cyst with thin walls and cheesy caseous contents at the seat of inoculation. In the lung a grey tubercle was seen. There was no tuberculosis elsewhere. The cause of death was not apparent.
H. 98. "B.R." (*Tuberculous meningitis.*)	Cerebro-spinal fluid through G.P. 2878.	49 days	50·0 mg.	1766	950	2,000	Killed 162 days	There was a group of caseous softened nodules up to a pea in size at the seat of inoculation, and no tuberculosis elsewhere.
			50·0 mg.	1767	2.650	2,470	Killed 162 days	There was a local cyst the size of a pullet's egg filled with thick caseo-pus. The lungs were crepitant; on the surface of one caudal lobe there was a thin superficial caseous gritty patch; on the other, irregular caseous tubercles forming a coarse network; elsewhere discrete and not numerous caseous gritty tubercles. There was a caseous tubercle in one kidney, and no tuberculosis elsewhere.
H. 104. "E.R." (*Tuberculosis of lungs with calcareous mesenteric glands.*)	Human lung	51 days	27·0 mg.	1810	2,370	2,900	Killed 168 days	Slight generalised tuberculosis. There was a very large thin-walled cyst at the seat of inoculation with caseo-purulent contents. The lungs showed at the tips a few soft yellow caseous nodules, and elsewhere a few grey miliary tubercles. One kidney contained a caseous tubercle and a caseous streak; two mammary glands were caseous, and a smear showed numerous degenerated T.B. There was no tuberculosis elsewhere.
	Human mesenteric gland.	87 days	50·0 mg.	1848	1,400	1,600	Killed 143 days	There was a caseous and softened local lesion the size of a thrush's egg. The lungs showed at the thin anterior margins grey patches with caseous gritty foci, and elsewhere a few minute grey tubercles, and also fairly numerous reddish-grey foci very suggestive of tubercles. Other organs and all the glands were normal.
H. 115. "N.G." (*Tuberculous meningitis.*)	Cerebro-spinal fluid through G.P. 3087	58 days	32·0 mg.	1987	2.000	2,690	Killed 145 days	There was a thin-walled cyst the size of a hen's egg at the seat of inoculation, filled with caseo-pus. The lungs were crepitant; in the anterior lobes there were softened caseous areas with vascular fibrous walls, in the rest of lungs eight or nine scattered tubercles were counted. There was no tuberculosis elsewhere.

RABBITS INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN—*continued.*

SLIGHTLY VIRULENT VIRUSES—*continued.*

SUBCUTANEOUS INOCULATIONS—*continued.*

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Number of Rabbit.	Weight in Grammes.		Duration of Life.	Result.
					Initial.	Final.		
H. 115. "N.G."—*continued.*	Cerebro-spinal fluid through G.P. 3087	58 days	10·0 mg.	**1986**	1,720	2,690	Killed 145 days	There was a small fibrous-walled cyst containing caseous masses and clear fluid one scapular gland contained two or three calcareo-caseous foci; the lungs showed on the surfaces about thirty nodules up to a small pea in size, caseous, some slightly gritty, with fibrous margins. There was no tuberculosis elsewhere.
H. 118. "F.C." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3343.	55 days	10·0 mg.	**2116**	1,440	1,650	Died 109 days	Death was due to pseudo-tuberculosis. There were several small caseous nodules in the subcutaneous tissues at the seat of inoculation, and the skin over them was ulcerated. The adjacent scapular gland contained caseous nodules, the other a caseous tubercle. The lungs showed half-a-dozen soft caseous nodules situated chiefly around the margins, and a few small grey tubercles.
			10·0 mg.	**2117**	1,540	2,300	Killed 152 days	There was a large thin-walled caseous and softened local lesion; one scapular gland contained calcareous tubercles, the other was cystic. The lungs showed a few superficial fibro-caseo-calcareous patches, and a few small caseating nodules.
H. 119. "E.S." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3439.	19 days	23·0 mg.	**2188**	1,570	2,070	Killed 95 days	The local lesion was composed of reddish-grey nodules with caseous softened centres; the adjacent glands were enlarged and caseating. The lungs contained scattered caseous nodules up to a hempseed in size with grey walls; one kidney contained a single grey nodule.
			10·0 mg.	**2189**	1,600	2,270	Killed 95 days	There was a thin-walled caseous and softened tumour the size of an orange at the seat of inoculation, and one of the adjacent glands contained a small cyst. The lungs showed on the dorsal surfaces and in the thin margins irregular grey tracts containing here and there caseous gritty foci; elsewhere on the surface and in the depth there were a few small scattered grey tubercles.
H. 120. "B.W." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3442.	22 days	10·0 mg.	**2194**	1,950	2,400	Killed 98 days	There was a flattened thin-walled caseous and softened local tumour; the nearest glands contained caseous gritty nodules and one tracheal gland a single softened caseous nodule. The lungs showed on the surface three greyish-red patches with caseous foci and a few scattered tubercles the largest with caseous centres. One kidney contained a single grey tubercle.
			10·0 mg.	**2195**	1,820	2,400	Killed 98 days	The local lesion was a thin-walled cyst the size of a hen's egg filled with caseopus. The nearest glands were slightly enlarged; one contained gritty foci, the other a small cyst. The lungs showed on the surface about a dozen superficial masses (the largest 2 × 1 cm.) composed of greyish-red tissue containing caseous gritty patches; there were also scattered over the surface grey nodules up to a hempseed in size with caseous gritty centres, and one or two were seen on section of the lung. One kidney contained a small grey tubercle.

H. 121. "E.A." *(Tuberculosis of the lung.)*	Human sputum through G.P. 3445.	28 days	26·0 mg.	2202	1,620	1,600	Killed 94 days	There was a nodular caseous lesion at the seat of inoculation, and each scapular gland contained a caseous focus. The lungs contained a few small grey nodules with caseous centres, and on the surface of each kidney there were a few pitted scars.
			10·0 mg.	2203	1,720	1,820	Killed 94 days	There was an ulcerated caseous local lesion; the nearest gland was enlarged and contained two softened caseous foci. The lungs contained about eighteen caseous and softened nodules with grey margins up to a split pea in size (smear, a few T.B.), and in the thin margins there were two flat grey patches with caseous foci.
H. 122. "F.P." *(Tuberculosis of the lung.)*	Human sputum through G.P. 3446.	22 days	37·0 mg.	2198	1,680	1,200	Died 12 days	Death from cellulitis of the subcutaneous tissues.
			10·0 mg.	2199	1,660	1,320	Died 6 days	Death from injuries.
		66 days	10·0 mg.	2338	950	1,770	Killed 106 days	There was a flattened thin-walled cyst containing thin yellow pus at the seat of inoculation; the nearest glands were normal. The lungs showed on the surface a moderate number of tubercles with grey margins and caseo-calcareous centres, and on the dorsal surfaces of the caudal lobes there were grey patches with caseo-calcareous foci; the thin margins of the lungs contained a few similar smaller patches; a few tubercles were seen on section of the lung. One tracheal gland contained a calcareous focus.
			10·0 mg.	2339	1,050	1,500	Killed 106 days	Thin-walled cyst with caseo-purulent contents, the size of a hen's egg, at the seat of inoculation; nearest glands normal. Lungs:—The thin margins were in places solid grey and caseating; elsewhere under the pleura a moderate number of irregular reddish-grey nodules containing caseous foci was seen, most numerous on the dorsal surfaces; a few caseating tubercles were seen on section of the lung. One kidney contained two tubercles, the other was normal.
H. 123. "W.W." *(Tuberculosis of the lung.)*	Human sputum through G.P. 3450.	25 days	21·0 mg.	2210	1,900	2,390	Killed 101 days	The local lesion was nodular caseous and softened, the size of a pigeon's egg. The nearest glands were normal. In the thin margins of the lungs there were small irregular grey patches with caseous foci, and elsewhere in the lungs a few grey tubercles.
			10·0 mg.	2211	1,120	1,650	Killed 101 days	There was a large thin-walled cyst filled with creamy caseo-pus at the seat of inoculation. The nearest glands were normal. Four greyish-red nodules with caseous foci were seen in the posterior tips of the lungs.
H. 124. "M.M." *(Tuberculosis of the lung.)*	Human sputum through G.P. 3452.	27 days	39·0 mg.	2214	1,900	2,000	Killed 100 days	Local tuberculosis, and tuberculosis of lungs and kidneys. There was a scar at the seat of inoculation and two large caseous nodules in the subcutaneous tissues; the scapular glands were caseous. The lungs were crepitant and showed a moderate number of nodules, caseous with grey margins or grey with caseous foci, ranging up to 8 mm. in diameter; on the surface of one caudal lobe there was a greyish-red patch (3·5×1·5×1 cm.) beset with softened caseous foci (smear, a few T.B.). There was a grey tubercle in each kidney.
			10·0 mg.	2215	1,950	1,600	Killed 100 days	General tuberculosis, progressive in the thorax. There was a cyst the size of a pigeon's egg with fibrous walls and caseo-purulent contents at the seat of inoculation; the adjacent glands were enlarged, caseous and softened. The lungs were crepitant and contained moderately numerous nodules up to a pea in size; these had softened caseous centres and grey margins, were irregular in outline and obviously extending; in the anterior lobes the nodules were more than 1 cm. in diameter (a smear from one showed a moderate number of T.B.), and the thin margins of these lobes were solid and caseating. The pleural surface of the diaphragm showed three flat caseating patches, one large, and on the costal pleura there were several pinkish growths; there was early tuberculosis of the mediastinal pleura. Two or three caseous foci were seen in the portal glands. There were two grey tubercles on the surface of each kidney and one caseous tubercle in the medulla of one. Liver and spleen normal.

RABBITS INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN—*continued.*

SLIGHTLY VIRULENT VIRUSES—*continued.*

SUBCUTANEOUS INOCULATIONS—*continued.*

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Number of Rabbit.	Weight in Grammes.		Duration of Life.	Result.
					Initial.	Final.		
H. 124. "M.M."—*continued.*	Human sputum through G.P. 3452.	160 days	10·0 mg.	**2435**	2,500	3,000	Killed 142 days	The local lesion was a cyst filled with caseo-pus; the adjacent glands were normal. In the thin margins and on the dorsal surfaces of the caudal lobes of the lungs grey patches containing caseous foci were seen, elsewhere the lungs showed a few scattered tubercles. One kidney contained a grey tubercle. There was no tuberculosis elsewhere.
			10·0 mg.	**2436**	1,500	2,750	Killed 142 days	The local lesion was large caseous and softened; the adjacent glands were normal. The lungs contained sparsely scattered miliary tubercles and one kidney a grey tubercle. There was no tuberculosis elsewhere.
H. 125. "A.P." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3454.	24 days	21·0 mg.	**2206**	1,570	1,870	Killed 100 days	At the seat of inoculation there was a lobulated thin-walled cyst the size of a goose's egg filled with creamy caseo-pus. The adjacent scapular gland was a small cyst containing clear fluid. There was no tuberculosis elsewhere.
			10·0 mg.	**2207**	1,490	1,800	Killed 100 days	There was a caseous nodule in the subcutaneous tissues at the seat of inoculation; the adjacent scapular gland was slightly enlarged and contained caseous gritty tubercles. The lungs contained very sparsely scattered caseous miliary tubercles, some gritty.
H. 126. "A.W." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3456.	27 days	13·0 mg.	**2218**	2,420	2,500	Killed 102 days	There was a thin-walled cyst the size of a hen's egg with thick caseo-purulent contents at the seat of inoculation. The nearest glands were normal. One lung contained a pea-sized caseous nodule, and one kidney a caseating nodule 2 mm. in diameter.
			10·0 mg.	**2219**	1,450	1,800	Killed 102 days	The local tumour was similar to that of Rabbit 2218. The gland adjacent to it was enlarged and contained three caseous and softened nodules. There was no tuberculosis elsewhere.
H. 129. "T.M." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3479.	33 days	12·0 mg.	**2257**	3,400	3,200	Killed 119 days	Local tuberculosis, severe tuberculosis of lungs, and slight tuberculosis of kidneys. There was a thin-walled cyst the size of an orange filled with caseo-pus at the seat of inoculation, and the adjacent glands contained each a caseous focus or two. The lungs were enlarged and did not collapse; they appeared from the surface to be composed throughout of tuberculous tissue (grey tissue with a network of caseous streaks); the pleura was slightly thickened in patches and very vascular. On section the anterior lobes were solid and caseating almost throughout; the caudal lobes were tuberculous for a varying depth and crepitant in the centre; the crepitant tissue was congested and contained caseous nodules; the condition of these lobes closely resembled that following an intravenous inoculation of human tubercle bacilli. Each kidney showed on the surface a few caseous tubercles and a few pits; the tubercles extended into the medulla as caseous streaks. Smears from the lungs and the kidney lesions showed each a few T.B. A culture obtained from the lung was eugonic and slightly virulent for the rabbit.

			10·0 mg	2256	2,370	1,900	Killed 119 days	Local tuberculosis and tuberculosis of lungs and kidneys. The local lesion was nodular and was composed of fibro-caseo-purulent nodules; one axillary gland was caseo-purulent, the other contained a caseous nodule. The lungs contained a moderate number of irregular firm caseous nodules, up to 5 mm. in diameter, with grey margins (smear, a few T.B.). The cortex of each kidney showed scattered grey translucent nodules up to 6 mm. in diameter with caseous foci; some projected from the surface like those caused by virulent tubercle bacilli, but their tissue was softer and not so caseous. There were a few yellow pinhead-sized tubercles in the liver in which no T.B. were found. A culture obtained from the lung was eugonic and slightly virulent for the rabbit.
	„	185 days	10·0 mg.	2437	1,450	3,200	Killed 149 days	There was a caseous abscess at the seat of inoculation and the nearest gland was partially softened. The lungs contained a few grey tubercles. There was no tuberculosis elsewhere.
			10·0 mg.	2438	1,350	3.070	Killed 149 days	The local lesion was a cyst filled with caseo-pus; the nearest glands were normal. A few grey nodules were seen in the lungs. There was no tuberculosis elsewhere.
H. 130. "N.B." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3481.	29 days	22·0 mg.	2236	2,100	2,550	Killed 113 days	There was a cyst with thin walls and a small amount of caseo-purulent contents at the seat of inoculation; the nearest glands were normal. The lungs contained sparsely scattered fibro-caseous and softened nodules up to a hempseed in size.
			10·0 mg.	2237	2,700	3,150	Killed 113 days	Thin-walled cyst containing caseo-pus at seat of inoculation; nearest glands normal. The caudal lobes of the lungs were covered with thin grey patches containing softened caseous foci; the thin margins of the lungs were grey and fibrous with caseous foci; elsewhere in the lungs fibrous tubercles and a few caseous nodules were seen. There was a grey tubercle in each kidney. One testicle showed an early caseating nodule, and one epididymis was enlarged grey and translucent, and infiltrated with sinuous caseous streaks.
H. 131. "M.H." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3483.	29 days	17·0 mg.	2240	3,400	3,150	Killed 114 days	There was a puckered scar, and a caseous nodule or two in the subcutaneous tissues at the seat of inoculation, and no tuberculosis elsewhere.
			10·0 mg.	2241	1,770	1,130	Died 54 days	The cause of death was not apparent. There was an ulcerated caseous local lesion and the adjacent glands were slightly enlarged; the lungs contained scattered miliary tubercles with caseous centres, and there were two caseous tubercles in one kidney.
H. 132 "O.O." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3485.	29 days	18·0 mg.	2244	2,320	2,350	Killed 119 days	The local lesion consisted of a thin-walled cyst with caseo-purulent contents. The nearest glands were normal. The lungs contained scattered grey miliary tubercles, many with caseous centres (smear, a few T.B.). Several of the mammary glands were enlarged, fibroid and caseo-purulent (a smear from the pus showed a few T.B.).
			10·0 mg.	2245	2,220	2,720	Killed 119 days	There was a local lesion, and no tuberculosis elsewhere.
H. 133. "P.K." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3449.	27 days	17·0 mg.	2331	850	1,600	Killed 106 days	There was a thin-walled cyst the size of a pigeon's egg filled with caseo-pus at the seat of inoculation, slightly ulcerated on the surface. The scapular glands were enlarged and composed of fibro-caseo calcareous tissue. There was no tuberculosis elsewhere.
			10·0 mg.	2330	900	1,520	Killed 106 days	The local lesion was composed of aggregated caseous nodules surrounded by thick fibrous capsules; the nearest gland contained two caseo-calcareous nodules. The lungs contained a moderate number of miliary caseo-calcareous tubercles with grey margins, and there were two minute tubercles in one kidney.

RABBITS INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN—*continued.*

SLIGHTLY VIRULENT VIRUSES—*continued.*

SUBCUTANEOUS INOCULATIONS—*continued.*

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Number of Rabbit.	Weight in Grammes.		Duration of Life.	Result.
					Initial.	Final.		
H. 133. "P.K."—*continued.*	Human sputum through G.P. 3449.	58 days	10·0 mg.	**2361**	1,170	2,250	Killed 103 days	The local lesion was a thin-walled cyst with caseous and softened contents; the nearest gland was enlarged. The lungs showed scattered irregular grey tubercles, many with caseous centres; there was a grey tubercle in one kidney.
H. 134. "K.K." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3489.	32 days	50·0 mg.	**2228**	2,500	3,200	Killed 105 days	Local lesion and slight tuberculosis of lungs and kidneys. There was a large cyst with caseo-purulent contents at the seat of inoculation; the nearest glands were normal. The lungs contained small scattered grey nodules, and in the thin margins some grey patches beset with caseous foci; in a caudal lobe there was also a firm caseous nodule over 1 cm. in diameter (smear, a few T.B.). The kidneys showed a few grey nodules up to a hemp-seed in size, the larger caseous in the centre; two in each kidney projected from the surface.
			10·0 mg.	**2229**	2,220	2,600	Killed 105 days	Slight general tuberculosis. There was a large ulcerated caseous local lesion, and the adjacent glands contained caseous and softened nodules. The lungs contained scattered nodules, grey with a caseous network, ranging up to 1 cm. in greatest diameter, situated chiefly on the surface (smear, a few T.B.). Each kidney contained three or four grey tubercles with caseous centres. The liver contained scattered submiliary tubercles with grey centres (smear, a few T.B.).
H. 135. "E.E." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3491.	28 days	16·0 mg.	**2232**	2,100	1,500	Died 12 days	Death from pneumonia.
			10·0 mg.	**2233**	2,100	1,850	Died 12 days	The cause of death was not apparent. There was no tuberculosis.
		59 days	44·0 mg.	**2337**	2,050	1,900	Died 13 days	Death was the result of injuries. There was a caseous local lesion the size of a pigeon's egg, and the adjacent gland was enlarged.
			10·0 mg.	**2336**	1,800	2,750	Killed 106 days	The local lesion was composed of an aggregation of caseous nodules with fibrous walls, the whole being about the size of a pigeon's egg. There was no tuberculosis elsewhere.
H. 136. "X.B." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3522.	36 days	100·0 mg.	**2299**	1,500	2,750	Killed 119 days	There was a thin-walled cyst the size of a cricket-ball filled with caseo-pus at the seat of inoculation, and the nearest gland was enlarged and contained a caseous and softened nodule. The lungs showed in the extreme thin margins small grey patches some containing caseous foci, and elsewhere a few grey tubercles. In the cortices of the kidneys there were four grey tubercles, two with caseous centres.
			10·0 mg.	**2297**	1,000	1,220	Died 42 days	Death was due to infarction of the lung. There was a dense caseous local lesion the size of a hen's egg, and the nearest gland was enlarged but not caseous. The crepitant parts of the lungs showed scattered tuberculous lesions. Three or four grey tubercles were seen in the kidneys.

			10·0 mg.	2298	1,800	1,550	Died 36 days	Death was due to cirrhosis of liver. There was a thin-walled cyst at the seat of inoculation containing muco-pus, and the adjacent scapular gland was enlarged and contained caseous nodules (smear, T.B. numerous). The lungs showed some small grey tubercles, a few of which were becoming confluent.
H. 137. "O.B." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3524.	27 days	20·0 mg.	2277	1,200	1,300	Died 35 days	Slight disseminated tuberculosis. There was a fairly large caseous local tumour, breaking down in the centre. The scapular glands were enlarged and contained some caseous tubercles. The lungs contained a moderate number of grey tubercles with caseous centres; one lobe was extensively red and airless; the rest of the organ was crepitant. There were two opaque tubercles in one kidney (smear, a few T.B.).
			10·0 mg.	2276	1,400	2,350	Killed 126 days	There was a thin-walled cyst filled with caseo-pus at the seat of inoculation, and no tuberculosis elsewhere.
H. 138. "C.C." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3526.	25 days	35·0 mg.	2261	2,200	2,500	Killed 124 days	The local tumour was the size of a hen's egg, caseous and softened. The nearest glands were normal. There were two or three tubercles in the lungs, one in a kidney, and no tuberculosis elsewhere.
			10·0 mg.	2260	1,550	2.100	Killed 124 days	The local tumour was the size of a pullet's egg, caseous and softened. The nearest glands were normal. There were two or three submiliary tubercles in the lungs, and no tuberculosis elsewhere.
H. 139. "K.H." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3529.	25 days	20·0 mg.	2265	1,400	1,870	Killed 124 days	There was a large thin-walled caseous abscess at the seat of inoculation, and each scapular gland was a cyst with watery contents. The lungs contained a moderate number of grey miliary tubercles, the larger with calcareous centres. There were a good many small pits on the surface of each kidney; one contained three caseous tubercles, and its calyces were filled with caseo-pus, the other showed one small grey tubercle only.
			10·0 mg.	2264	1,300	2,150	Killed 124 days	There was a very large thin-walled lobulated local lesion filled with caseo-pus; the nearest glands were normal. The lungs contained half-a-dozen grey tubercles; in one kidney there was a grey tubercle, in the other a grey nodule slightly raised from the surface and extending into the medulla as a caseous wedge.
H. 140. "J.J." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3607.	28 days	100·0 mg.	2319	1,550	1,850	Killed 110 days	The local lesion was a cyst the size of a turkey's egg with thin walls and caseo-purulent contents. The nearest glands were normal. There was a large pea-sized irregular caseous gritty nodule in one caudal lobe of the lung and a small grey patch in the thin margin of the other. There were two grey tubercles in the cortex of each kidney, one with a caseous centre.
			10·0 mg.	2318	1,300	2,150	Killed 110 days	There was a very large thin-walled lobulated cyst with caseo-purulent contents at the seat of inoculation, and one scapular gland contained two caseo-calcareous nodules and a cyst filled with clear fluid. There were about a dozen firm caseo-calcareous nodules in each lung; the largest were flattened and ranged up to 8 mm. in diameter; the majority were much smaller. One kidney showed a calcareous focus, the other was normal.
H. 141. "C.H." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3532.	27 days	30·0 mg.	2281	1,450	2,070	Killed 127 days	The local tumour was large thin-walled flabby and filled with caseo-pus. The nearest glands were enlarged. There was a patch of aggregated grey tubercles with caseous centres on the dorsal surface of each lung; elsewhere on the surface similar scattered tubercles, discrete and in groups, were seen. There was a small grey tubercle in each kidney.

RABBITS INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN—*continued.*

SLIGHTLY VIRULENT VIRUSES—*continued.*

SUBCUTANEOUS INOCULATIONS—*continued.*

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Number of Rabbit.	Weight in Grammes.		Duration of Life.	Result.
					Initial.	Final.		
H. 141. "C. H."—*continued.*	Human sputum through G.P. 3532.	27 days	10·0 mg.	**2280**	1,400	2,200	Killed 127 days	There was a thin-walled lobulated cyst of moderate size filled with caseo-pus at the seat of inoculation; the nearest glands were normal. The lungs contained about a dozen caseous gritty nodules with fibrous walls, up to 2 mm. in diameter. There was no tuberculosis elsewhere.
H. 142. "Q.H." *(Tuberculosis of the lung.)*	Human sputum through G.P. 3534.	28 days	10·0 mg.	**2269**	1,470	2,050	Killed 125 days	There was a large thin-walled cyst with caseo-purulent contents; the nearest glands were normal; the lungs contained scattered caseous or caseo-calcareous miliary tubercles and in the thin margin three small caseating patches; there was no tuberculosis elsewhere.
			5·0 mg.	**2268**	1,380	1,900	Killed 125 days	There was a large thin-walled lobulated cyst filled with caseo-pus; the nearest glands were normal; the lungs contained a few small tubercles and a grey caseating patch; there was no tuberculosis elsewhere.
H. 143. "L.L." *(Tuberculosis of the lung.)*	Human sputum through G.P. 3536.	28 days	10·0 mg.	**2285**	1,300	530	Died 89 days	General tuberculosis. Probable immediate cause of death, secondary infection of local lesion. There was a very large nodular, caseous, and softened local lesion which was covered with a projecting rupial scab and had apparently become secondarily infected. One axillary gland contained a few caseous foci; the scapular glands were enlarged. The lungs collapsed partially; they contained moderately numerous firm irregular completely caseous nodules in places confluent, up to 1 cm. in diameter (smear, T.B. numerous); the intervening lung tissue was crepitant. The liver contained a moderate number of opaque whitish miliary tubercles (smear, a few T.B.). There were one or two tubercles in each kidney, one caseous, the others grey. The spleen was normal. A culture obtained from the lung was eugonic, and slightly virulent for the rabbit.
			6·0 mg.	**2284**	1,400	1,070	Died 8 days	The cause of death was not apparent.
	"	176 days	10·0 mg.	**2439**	1,450	3,300	Killed 149 days	There was an empty cavity at the seat of inoculation; one scapular gland contained calcareous grains. The lungs showed a few reddish-grey nodules containing caseous foci. A few miliary grey tubercles were seen in the cortex of each kidney. There was no tuberculosis elsewhere.
			10·0 mg.	**2440**	1,250	2,850	Killed 149 days	Local tuberculosis, tuberculosis of lungs, and very slight tuberculosis of kidneys. There was a large cyst at the seat of inoculation filled with pus; the nearest glands were normal. The lungs were enlarged; the thin margins were solid and the surfaces very extensively covered by reddish-grey solid tracts containing caseous foci; internally the lung parenchyma contained scattered grey nodules with caseous foci. There was a scar on the surface of each kidney, one of which contained a grey tubercle.

H. 144. "D.B." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3614.	33 days	100·0 mg.	**2335**	1,000	1,750	Killed 107 days	There was a very large lobulated caseous and softened local lesion; the nearest glands were normal. The lungs showed a few small grey patches in the thin margins and elsewhere about a dozen grey tubercles, some of which contained a minute yellow focus.
			10·0 mg.	**2334**	1,100	1,670	Killed 107 days	The tumour at the seat of inoculation was irregular caseous and softened, the size of a pigeon's egg. The nearest glands were normal. The lungs contained scattered nodules up to a hempseed in size; the majority were grey and translucent throughout or showed a minute caseous focus or two; a few were caseous.
H. 145. "G.W." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3540.	28 days	30·0 mg.	**2289**	1,550	2,250	Killed 127 days	The local lesion was a large thin-walled cyst the size of a tennis-ball, filled with caseo-pus. One scapular gland contained a caseous and softened tubercle, the other was normal. The thin margins of the lungs here and there were grey and showed caseous foci or fine yellow arborisations, elsewhere in the lungs a few grey tubercles were seen. There was a small elongated caseous focus in one kidney, the other was normal.
			10·0 mg.	**2288**	1,600	2,250	Killed 127 days	There was a thin-walled cyst the size of a small orange containing creamy caseo-pus at the seat of inoculation. The adjacent glands were normal. There was a small grey patch containing caseous points in the thin margin of one lung. Other organs and the glands were normal.
H. 147. "P.C." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3832.	82 days	10·0 mg.	**2480**	1,900	2,750	Killed 103 days	The local lesion was a thin-walled cyst filled with caseo-pus; the nearest glands were normal. The lungs showed scattered miliary tubercles with caseous centres There was no tuberculosis elsewhere.
			10·0 mg.	**2481**	1,400	2,220	Killed 103 days	There was a caseous local lesion, and the nearest glands were normal. The thin margins of the lungs were grey, with caseous foci; patches and nodules of similar tissue were seen on the dorsal surfaces. and there were a few elsewhere in the lungs. There was no tuberculosis elsewhere.
			10·0 mg.	**2482**	1,900	2,070	Killed 103 days	The local lesion was a large thin-walled cyst containing caseo-pus; the nearest glands were normal. The lungs contained scattered tubercles, some grey with caseous foci, some caseous; one kidney contained a grey nodule with a caseous centre. There was no tuberculosis elsewhere.

MIXED VIRUSES.

INTRAVENOUS INOCULATIONS.

H. 90. "I.P." (*Primary abdominal tuberculosis.*)	Human retro-peritoneal gland.	94 days	1·0 mg.	**1551**	2,070	2,540	Died 26 days	General tuberculosis. The lungs were crepitant and contained a moderate number of caseous tubercles and many minute just visible grey tubercles. The liver showed a few grey points, the spleen was much swollen and closely beset with minute tubercles; the kidneys were mottled with irregular dark-grey tubercles some with minute caseous centres.
			0·1 mg.	**1552**	2,070	1,180	Died 79 days	Tuberculosis of lungs and kidneys. The lungs were crepitant and contained a moderate number of irregular grey tubercles with caseous centres, and two or three larger softened caseous nodules in the posterior parts of the caudal lobes. In one kidney there were three greyish tubercles, in the other there was a prominent caseous nodule in the cortex, a few grey tubercles in the medulla, and a focus of caseo-pus near the papilla.

RABBITS INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN—*continued.*

MIXED VIRUSES—*continued.*

INTRAVENOUS INOCULATIONS—*continued.*

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milligrammes.	Number of Rabbit.	Weight in Grammes.		Duration of Life.	Result.
					Initial.	Final.		
H. 90. "I.P."—*continued.*	Human retro-peritoneal gland.	240 days	1·0 mg.	**1793**	2,580	1,400	Died 32 days	General tuberculosis. The lungs were crepitant and rather closely beset with pinhead sized caseous tubercles, here and there confluent. The liver was very closely beset with small grey foci; the spleen was slightly enlarged and contained scattered caseous tubercles; the kidneys showed on the surface a greyish mottling suggesting a general tuberculous infiltration, and in the cortex and medulla there were fairly numerous miliary caseous tubercles. A number of translucent tubercles were seen on the mesentery; the coeliac and portal gland showed early caseation. the bronchial an occasional caseous tubercle. T.B. were numerous in a smear from the liver.
		94 days	0·1 mg.	**1794**	2,350	1,500	Died 64 days	General tuberculosis. The lungs were heavy and composed practically throughout of caseous tracts separated by a small amount of lung tissue. The kidneys showed on the surface fairly numerous caseous nodules with grey margins; the majority on section were wedge-shaped and penetrated to the medulla. There were scattered translucent tubercles on the mesentery. The bronchial glands were enlarged and contained two or three caseous tubercles; one mesenteric gland contained a single tubercle. There were several grey filmy tubercles on the surface of the spleen, none in the pulp. T.B. were very numerous in a smear from the lung.
		94 days	0·01 mg.	**1795**	1,800	1,100	Died 116 days	General tuberculosis. The lungs were packed with caseating tubercles which caused almost complete consolidation; there were solid caseous areas in the margins and the posterior parts of the caudal lobes were riddled with cavities, some containing air others caseo-pus. The kidneys were closely beset with caseating nodules, many projecting; a good many extended as a wedge into the cortex and a few of the calyces contained caseo-pus. One testicle contained three firm caseous nodules, the other a caseous tubercle. The omentum showed early tubercles. T.B. were numerous in smears from the lung and the kidney.
	Human mesentric gland through G.P. 2522.	208 days	1·0 mg.	**1773**	3,200	2,620	Died 15 days	Acute tuberculosis. The lungs contained fairly numerous minute transparent grey foci; the spleen was much swollen soft and dark red. No definite foci were seen in the liver or kidneys.
			0·1 mg.	**1774**	2,000	2,100	Killed 209 days	Tuberculosis of lungs, kidneys, and mamma. In the anterior lobes of the lungs there were caseo-purulent areas surrounded by trabeculae of fibrous tissue; the caudal lobes showed similar areas and also firm irregular caseating patches. On the surfaces of the kidneys there were a few depressed scars, some containing fibrous or fibro-caseous nodules; in the medullae a few caseous foci were seen and in the calyces a flake or two of caseo-pus. The mammary glands were enlarged and showed caseo-purulent foci set in fibrous tissue. A smear from the lung showed a few T.B.

H. 60. "W.B." (*General miliary tuberculosis of uncertain origin.*)	Human bronchial gland through G.P. 1825.	72 days	10·0 mg.	**907**	1,590	1,000	Killed 28 days (when dying).	General tuberculosis.
			1·0 mg.	**908**	1,670	1,120	Died 33 days	General tuberculosis.
			0·1 mg.	**909**	1,610	1,060	Died 83 days	Chronic tuberculosis progressive in the lungs. There was a small caseous nodule in the subcutaneous tissues of the abdominal wall, and some dry caseous streaks in the omentum. One mesenteric and one coeliac gland contained each a single focus. Each kidney showed depressed scars on the surface, a few little tubercles between the cortex and medulla, and muco-pus in the calyces. There were many fibro-caseous tubercles more or less confluent in the lungs; parts of the organ were deeply congested and airless.
	"	121 days	1·0 mg.	**933**	1,890	1,080	Died 36 days	General tuberculosis.
			0·1 mg.	**934**	1,850	1,700	Killed 118 days (when ill).	Chronic general tuberculosis. The omentum was slightly thickened and fibro-caseous and highly calcareous along its lower border; elsewhere in the omentum and on the peritoneum covering the large intestine, the mesentery, and diaphragm there were sparsely scattered calcareous tubercles. The kidneys contained sparsely-scattered tubercles with opaque centres. The lungs were crepitant and contained moderately numerous irregular nodules here and there confluent, up to 2 mm. in diameter, with grey margins and caseo-calcareous centres; numerous minute grey tubercles could also be seen. The synovial membrane on each side of the patellae was thickened and caseating, and there was a prominent caseous tumour on the outer part of the right ankle; smears from these lesions showed numerous T.B.
			0·1 mg.	**935**	1,520	1,300	Died 82 days	General tuberculosis.
			0·01 mg.	**936**	2,220	1,350	Died 96 days	General tuberculosis.
	Human mesenteric gland through G.P. 1829.	41 days	10·0 mg.	**864**	1,000	2,500	Killed 98 days	There were fibrous tubercles on the mesentery and omentum, and a caseous collection in the pelvis of the right kidney. There was no tuberculosis elsewhere.
			1·0 mg.	**865**	960	2,350	Killed 98 days	There were fibrous tubercles on the mesentery and omentum, one prominent white tubercle in the right kidney and a small tubercle with opaque centre in the lung. There was no tuberculosis elsewhere.
			1·0 mg.	**866**	1,000	2,500	Killed 98 days	There were fibrous tubercles on the mesentery, omentum, and the surface of rectum, and a prominent white tubercle in the left kidney. There was no tuberculosis elsewhere.
	Human lung through G.P. 1827.	60 days	10·0 mg.	**886**	1,080	1,240	Died 45 days	There was slight tuberculosis of the peritoneum. The cause of death was not apparent.
			1·0 mg.	**887**	1,120	3,000	Killed 107 days	Many cysticerci in the omentum and on the bladder had dry caseous contents (smear, T.B. numerous). There was no sign of tuberculosis elsewhere.
	Human meninges through G.P. 1832.	36 days	10·0 mg.	**826**	1,100	2,700	Killed 92 days	The inoculation was partly intracoecal; there was a group of four abscesses each the size of a small pea in the wall of the caecum. There were a few small fibrous tubercles in the meso-colon and omentum, and no sign of tuberculosis elsewhere.
			1·0 mg.	**827**	1,000	2,350	Killed 92 days	There was a moderate number of small fibro-calcareous tubercles in the mesentery, meso-colon, and omentum, a small fibrous tubercle in the right kidney, two doubtful points in the left, and no tuberculosis elsewhere.

RABBITS INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN—*continued*.

MIXED VIRUSES—*continued*.

SUBCUTANEOUS INOCULATIONS.

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Number of Rabbit.	Weight in Grammes.		Duration of Life.	Result.
					Initial.	Final.		
H. 90. "I.P." (*Primary abdominal tuberculosis.*)	Human retro-peritoneal gland.	94 days	10·0 mg.	**1553**	1,800	2,650	Killed 111 days	General tuberculosis. In the subcutaneous tissues of the back there were two softened caseous nodules and a patch of caseo-pus; the right scapular gland contained a caseous nodule. The lungs were crepitant and contained firm caseous nodules up to a small pea in size, most numerous in the right. There were caseous patches and nodules on the ventral mediastinal and visceral pleurae and numerous small grey tubercles on the omentum. In each kidney there were a dozen or more projecting caseous nodules up to a hempseed in size. There was an ulcerated caseous nodule (2·5 mm.) and two fibrous tubercles in the wall of the small intestine. A smear from a kidney nodule showed a few T.B.
	"	94 days	10·0 mg.	**1554**	1,150	2,050	Killed 111 days	General tuberculosis. The local tumour was composed of a series of large nodules up to a pigeon's egg in size filled with caseo-pus; one had ulcerated through the skin and was discharging caseo-pus. The adjacent scapular gland showed a few caseous foci. The lungs contained scattered caseating nodules up to a hempseed in size and some caseating patches in the thin margins. Each kidney contained two hempseed-sized caseating nodules, one showed also a few grey tubercles and some of the calyces of the other were filled with pus.
	"	340 days	10·0 mg.	**1923**	1,250	2,500	Killed 296 days	Slight generalised tuberculosis. There was a large thin-walled cyst with caseo-purulent contents at the seat of inoculation, and the nearest gland was enlarged and caseous. The lungs contained sparsely scattered caseous tubercles and around the margins a number of loosely attached flattened caseous nodules; in the thin margins a few small reddish patches with caseous foci were seen. There were a few loosely attached caseous nodules on the parietal pleura. One testicle contained a large caseous nodule. There was no tuberculosis elsewhere.
			10·0 mg.	**1924**	1,250	2,400	Killed 296 days	Chronic general progressive tuberculosis. There was a dense ulcerated caseous local lesion, and the nearest gland was partly calcareo-caseous. The lungs contained numerous irregular caseous masses varying in size; there were some small caseous growths on the surface. Many large lenticular caseous masses were seen on the parietal pleura and a few on the diaphragm. There were scattered grey nodules up to a hempseed in size with small caseous centres in the cortices of the kidneys. In the wall of the caecum was a large caseous nodule ulcerated on the mucous surface.
	Human mesenteric gland through G.P. 9522.	208 days	50·0 mg.	**1775**	1,550	2,850	Killed 209 days	There was a thin-walled cyst the size of a cricket-ball at the seat of inoculation filled with thick caseo-pus; the nearest gland was enlarged but not caseous; other glands and the organs were normal.
			15·0 mg.	**1776**	950	2,800	Killed 209 days	There was a bean-sized caseous nodule at the seat of inoculation. The lungs contained one caseous nodule (2 mm.), a caseous tubercle and a small grey tubercle. There was no sign of tuberculosis elsewhere.

INOCULATION EXPERIMENTS ON GUINEAPIGS.

GUINEAPIGS INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN.

VIRULENT VIRUSES.

Intraperitoneal Inoculations.

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Number of Guineapig.	Weight in Grammes.		Duration of Life.	Result.
					Initial.	Final.		
H. 69. "F.K." ... ... *(Primary abdominal tuberculosis.)*	Human mesenteric glands through G.P. 1962.	64 days	1·0 mg.	2165	350	250	Died 19 days	General tuberculosis.
			0·1 mg.	2167	400	250	Died 23 days	General tuberculosis.
	Human meninges through G.P. 1924 ...	153 days	1·0 mg.	2036	430	330	Died 10 days	Acute tuberculosis.
			0·1 mg.	2035	430	270	Died 18 days	General tuberculosis.
H. 77. "R.L." ... ... *(Primary abdominal tuberculosis.)*	Human mesenteric gland	121 days	0·1 mg.	2338	270	200	Died 20 days	General tuberculosis.
	Human liver through G.P. 2102	74 days	0·1 mg.	2331	250	190	Died 20 days	General tuberculosis.
			0·1 mg.	2332	230	220	Died 12 days	General tuberculosis.
H. 88. "E.L." ... ... *(Primary abdominal tuberculosis.)*	Human mesenteric gland	86 days	0·1 mg.	2510	320	270	Died 28 days	General tuberculosis. Injection partly sub-peritoneal.
H. 89. "W.I." ... ... *(Primary abdominal tuberculosis.)*	Human mesenteric gland	69 days	1·0 mg.	2576	220	220	Died 16 days	General tuberculosis. Injection partly subcutaneous.
	Human lung through G.P. 2474	123 days	0·1 mg.	2639	460	390	Died 16 days	Acute general tuberculosis.
H. 127. "R.R." (*a*) ... ... *(Tuberculosis of the lung.)*	Human sputum through G.P. 3474 ...	38 days	0·1 mg.	3671	800	650	Died 14 days	General tuberculosis.
H. 127. "R.R." (*b*)	Human sputum through G.P. 3743 ...	50 days	0·1 mg.	3803	490	260	Died 18 days	General tuberculosis.
H. 128. "D.D." (*a*) ... ... *(Tuberculosis of the lung.)*	Human sputum through G.P. 3584 ...	35 days	0·1 mg.	3730	850	570	Died 13 days	Acute tuberculosis.

Subcutaneous Inoculations.

H. 69. "F.K." ... ... *(Primary abdominal tuberculosis.)*	Human mesenteric gland through G.P. 1962.	64 days	1·0 mg.	2166	400	300	Died 45 days	General tuberculosis.
			0·1 mg.	2168	400	340	Died 59 days	General tuberculosis.

	Human meninges through G.P. 1924 ...	153 days	1·0 mg.	2038	440	350	Died 57 days	General tuberculosis.
			0·1 mg.	2037	400	300	Died 54 days	General tuberculosis.
H. 77. "R.L." ... ... (*Primary abdominal tuberculosis.*)	Human mesenteric gland, direct ...	121 days	0·1 mg.	2339	250	270	Died 55 days	General tuberculosis.
H. 88. "E.L." ... ... (*Primary abdominal tuberculosis.*)	Human mesenteric gland	86 days	0·1 mg.	2511	270	300	Died 40 days	General tuberculosis.
H. 89. "W.I." ... ... (*Primary abdominal tuberculosis.*)	Human mesenteric gland	69 days	1·0 mg.	2577	250	330	Died 71 days	General tuberculosis.
	Human lung through G.P. 2474	123 days	0·1 mg.	2640	280	300	Died 59 days	General tuberculosis.
H. 127. "R.R." (*a*) ... ... (*Tuberculosis of the lung.*)	Human sputum through G.P. 3474 ...	38 days	0·1 mg.	3672	550	350	Died 33 days	General tuberculosis.
H. 127. "R.R." (*b*)	Human sputum through G.P. 3743 ...	50 days	0·1 mg.	3804	390	320	Died 54 days	Severe general tuberculosis.
H. 128. "D.D." (*a*) ... ... (*Tuberculosis of the lung.*)	Human sputum through G.P. 3584 ...	35 days	0·1 mg.	3731	570	450	Died 47 days	General tuberculosis.

SLIGHTLY VIRULENT VIRUSES.

INTRAPERITONEAL INOCULATIONS.

H. 67. "E.P." ... ... (*Multiple tuberculosis of bones.*)	Pus from scapular abscess through G.P. 1914.	108 days	1·0 mg.	1966	390	300	Died 47 days	General tuberculosis.
			0·1 mg.	1964	310	320	Died 24 days	Slight general tuberculosis. Amount of disease not sufficient entirely to account for death.
H. 68. "R.B." ... ... (*Tuberculosis of the sacrum.*)	Pus from sacral abscess	190 days	1·0 mg.	1985	390	250	Died 39 days	General tuberculosis.
			0·1 mg.	1987	370	270	Died 40 days	General tuberculosis.
H. 70. "N.W." ... ... (*Primary abdominal tuberculosis.*)	Human mesenteric gland through G.P. 1928.	50 days	1·0 mg.	1970	370	290	Died 20 days	General tuberculosis.
			0·1 mg.	1972	380	280	Died 40 days	General tuberculosis.
	Human bronchial gland	140 days	0·1 mg.	1976	320	270	Died 40 days	General tuberculosis.
H. 72. "H.C." ... ... (*Tuberculosis of a rib.*)	Pus from abscess of rib through G.P. 1945	82 days	1·0 mg.	1993	330	210	Died 25 days	General tuberculosis.
			0·1 mg.	1995	300	320	Died 41 days	General tuberculosis.
H. 74. "D.S." ... ... (*Primary abdominal tuberculosis.*)	Human mesenteric glands...	77 days	1·0 mg.	2228	470	330	Died 20 days	General tuberculosis.
			0·1 mg.	2230	410	300	Died 34 days	General tuberculosis.

GUINEAPIGS INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN—*continued.*

SLIGHTLY VIRULENT VIRUSES—*continued.*

INTRAPERITONEAL INOCULATIONS—*continued.*

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Number of Guineapig.	Weight in Grammes.		Duration of Life.	Result.
					Initial.	Final.		
H. 74. "D.S."—*continued.*	Human lung through G.P. 2004	63 days	1·0 mg.	2266	390	310	Died 17 days	General tuberculosis
	Human bronchial gland	77 days	1·0 mg.	2224	450	400	Died 27 days	General tuberculosis.
			0·1 mg.	2226	450	350	Died 38 days	General tuberculosis.
	Human spleen	86 days	1·0 mg.	2259	300	190	Died 18 days	General tuberculosis.
H. 75. "A.H." ... ... *(Primary abdominal tuberculosis.)*	Human peritoneal fluid through G.P. 2018.	99 days	1·0 mg.	2305	440	400	Died 14 days	General tuberculosis. Injection partly intramuscular.
			0·1 mg.	2308	300	210	Died 26 days	General tuberculosis.
H. 76. "G.M." ... ... *(Tuberculosis of knee-joint.)*	Human synovial membrane through G.P. 2887.	38 days	1·0 mg.	3012	270	220	Died 13 days	General tuberculosis.
H. 78. "O.D." ... ... *(General tuberculosis probably primary in cervical glands.)*	Human lung through G.P. 2123	60 days	1·0 mg.	2290	300	210	Died 21 days	General tuberculosis.
			0·1 mg.	2292	400	400	Died 21 days	General tuberculosis.
	Human bronchial gland	98 days	1·0 mg.	2321	510	400	Died 16 days	General tuberculosis.
			0·1 mg.	2323	630	550	Died 65 days	General tuberculosis.
	Human meninges through G.P. 2122 ...	77 days	0·1 mg.	2325	310	240	Died 25 days	General tuberculosis.
H. 79. "J.N." ... ... *(Tuberculosis of lung.)*	Human lung...	85 days	1·0 mg.	2327	370	320	Died 18 days	General tuberculosis.
			0·1 mg.	2329	250	220	Died 17 days	General tuberculosis.
H. 80. "D.M." ... ... *(Tuberculosis of lung.)*	Human lung	81 days	0·1 mg.	2342	300	300	Died 43 days	General tuberculosis.
H. 81. "P.W." ... ... *(Tuberculosis of lung.)*	Human lung...	72 days	0·1 mg.	2340	270	210	Died 35 days	General tuberculosis.
		120 days	0·00001 mg.	2451	300	530	Died 320 days	Chronic general tuberculosis.
			0·00001 mg.	2452	210	370	Died 169 days	General tuberculosis.

H. 82. "**G.F.**" ... ... *General tuberculosis primary in the alimentary tract.)*	Human lung through G.P. 2242	81 days	1·0 mg.	2442	220	190	Died 24 days	General tuberculosis, with pseudo-tuberculosis of mesenteric glands.
			0·1 mg.	2444	220	410	Died 161 days	General tuberculosis.
H. 83. "**G.C.**" ... ... *(General tuberculosis primary in the alimentary tract.)*	Human mesenteric gland	95 days	0·1 mg.	2446	250	200	Died 38 days	General tuberculosis.
	Human bronchial gland	95 days	1·0 mg.	2448	240	320	Died 95 days	Slight general tuberculosis, with pseudo-tuberculosis.
H. 86. "**C.P.**" ... ... *(Tuberculosis primary in the lung.)*	Human meninges through G.P. 2395 ...	57 days	1·0 mg.	2503	300	210	Died 29 days	General tuberculosis.
H. 87. "**W.D.**" ... ... *(Tuberculosis of the suprarenal bodies.)*	Human suprarenal body through a guineapig.	56 days	1·0 mg.	2476	220	170	Died 15 days	Slight general tuberculosis.
H. 93. "**C.D.**" ... ... *(General miliary tuberculosis.)*	Human lung through G.P. 2610	78 days	1·0 mg.	2862	170	160	Died 18 days	General tuberculosis.
H. 98. "**B.R.**" ... ... *(Tuberculous meningitis.)*	Human cerebro-spinal fluid through G.P. 2878.	49 days	1·0 mg.	2998	600	330	Died 18 days	General tuberculosis
H. 104. "**E.R.**" ... ... *(Tuberculosis of lungs with calcareous mesenteric glands.)*	Human lung...	373 days	0·01 mg.	3514	270	250	Died 43 days	General tuberculosis.
			0·01 mg.	3515	220	200	Died 20 days	Early slight general tuberculosis.
H. 115. "**N.G.**" ... ... *(Tuberculous meningitis.)*	Human cerebro-spinal fluid through G.P. 3087.	58 days	1·0 mg.	3266	270	170	Died 33 days	General tuberculosis.
			0·1 mg.	3264	320	250	Died 27 days	General tuberculosis.
H. 118. "**F.C.**" ... ... *(Tuberculosis of the lung.)*	Human sputum through G.P. 3343 ...	55 days	0·1 mg.	3430	270	200	Died 14 days	General tuberculosis.
H. 119. "**E.S.**" ... ... *(Tuberculosis of the lung.)*	Human sputum through G.P. 3439 ...	19 days	0·1 mg.	3619	500	370	Died 11 days	Early general tuberculosis insufficient to account for death.
H. 120. "**B.W.**" ... ... *(Tuberculosis of the lung.)*	Human sputum through G.P. 3442 ...	22 days	0·1 mg.	3621	550	400	Died 29 days	General tuberculosis.
H. 121. "**E.A.**" ... ... *(Tuberculosis of the lung.)*	Human sputum through G.P. 3445 ...	28 days	0·1 mg.	3631	500	400	Died 24 days	General tuberculosis.
H. 122. "**F.P.**" ... ... *(Tuberculosis of the lung.)*	Human sputum through G.P. 3446 ...	22 days	0·1 mg.	3623	700	530	Died 20 days	General tuberculosis.
H. 123. "**W.W.**" ... ... *(Tuberculosis of the lung.)*	Human sputum through G.P. 3450 ...	25 days	0·1 mg.	3635	590	500	Died 22 days	General tuberculosis.
H. 124. "**M.M.**" ... ... *(Tuberculosis of the lung.)*	Human sputum through G.P. 3452 ...	27 days	0·1 mg.	3637	550	450	Died 25 days	General tuberculosis.
H. 125. "**A.P.**" ... ... *(Tuberculosis of the lung.)*	Human sputum through G.P. 3454 ...	24 days	0·1 mg.	3633	520	350	Died 20 days	General tuberculosis.

GUINEAPIGS INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN—*continued.*

SLIGHTLY VIRULENT VIRUSES—*continued.*

INTRAPERITONEAL INOCULATIONS—*continued.*

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Number of Guineapig.	Weight in Grammes.		Duration of Life.	Result.
					Initial.	Final.		
H. 126. "A.W." ... ... (*Tuberculosis of the lung.*)	Human sputum through G.P. 3456 ...	27 days	0·1 mg.	3640	220	200	Died 14 days	Early slight general tuberculosis insufficient to account for death.
H. 129. "T.M." ... ... (*Tuberculosis of the lung.*)	Human sputum through G.P. 3479 ...	33 days	0·1 mg.	3661	550	400	Died 20 days	General tuberculosis.
H. 130. "N.B." ... ... (*Tuberculosis of the lung.*)	Human sputum through G.P. 3481 ...	29 days	0·1 mg.	3649	700	550	Died 17 days	General tuberculosis.
H. 131. "M.H." ... ... (*Tuberculosis of the lung.*)	Human sputum through G.P. 3483 ...	29 days	0·1 mg.	3651	550	450	Died 35 days	General tuberculosis.
H. 132. "O.O." ... ... (*Tuberculosis of the lung.*)	Human sputum through G.P. 3485 ...	29 days	0·1 mg.	3653	550	450	Died 22 days	General tuberculosis.
H. 133. "P.K." ... ... (*Tuberculosis of the lung.*)	Human sputum through G.P. 3449 ...	27 days	0·1 mg.	3738	300	170	Died 27 days	General tuberculosis.
		58 days	0·1 mg.	3765	320	250	Died 13 days	Early general tuberculosis, not severe.
H. 134. "K.K." ... ... (*Tuberculosis of the lung.*)	Human sputum through G.P. 3489 ...	32 days	0·1 mg.	3645	800	550	Died 30 days	General tuberculosis.
H. 135. "E.E." ... ... (*Tuberculosis of the lung.*)	Human sputum through G.P. 3491 ...	28 days	0·1 mg.	3647	850	650	Died 21 days	General tuberculosis.
H. 136. "X.B." ... ... (*Tuberculosis of the lung.*)	Human sputum through G.P. 3522 ...	36 days	0·1 mg.	3709	550	450	Died 21 days	General tuberculosis.
H. 137. "O.B." ... ... (*Tuberculosis of the lung.*)	Human sputum through G.P. 3524 ...	27 days	0·1 mg.	3673	500	350	Died 28 days	General tuberculosis.
H. 138. "C.C." ... ... (*Tuberculosis of the lung.*)	Human sputum through G.P. 3526 ...	25 days	0·1 mg.	3665	270	250	Died 19 days	Early general tuberculosis, not severe.
H. 139. "K.H." ... ... (*Tuberculosis of the lung.*)	Human sputum through G.P. 3529 ...	25 days	0·1 mg.	3667	420	270	Died 16 days	Early general tuberculosis insufficient to account for death.
H. 140. "J.J." ... ... (*Tuberculosis of the lung.*)	Human sputum through G.P. 3607 ...	28 days	0·1 mg.	3732	350	250	Died 26 days	General tuberculosis.

H. 141. "C.H." ... ... *(Tuberculosis of the lung.)*	Human sputum through G.P. 3532 ...	27 days	0·1 mg.	3675	400	300	Died 30 days	General tuberculosis.
H. 142. "Q.H." ... ... *(Tuberculosis of the lung.)*	Human sputum through G.P. 3534 ...	28 days	0·1 mg.	3669	450	350	Died 19 days	Early general tuberculosis, not severe.
H. 143. "L.L." .. .. *(Tuberculosis of the lung.)*	Human sputum through G.P. 3536 ...	28 days	0·1 mg.	3681	450	370	Died 27 days	General tuberculosis.
H. 144. "D.B." ... . *(Tuberculosis of the lung.)*	Human sputum through G.P. 3614 ...	33 days	0·1 mg.	3740	570	320	Died 23 days	General tuberculosis.
H. 145. "G.W." ... ... *(Tuberculosis of the lung.)*	Human sputum through G.P. 3540 ...	28 days	0·1 mg.	3683	500	400	Died 16 days	Early general tuberculosis.

Subcutaneous Inoculations.

H. 67. "E.P." ... ... *(Multiple tuberculosis of bones.)*	Pus from scapular abscess through G.P. 1914.	108 days	1·0 mg.	1965	310	320	Died 165 days	General tuberculosis.
			0·1 mg.	1963	310	320	Died 76 days	General tuberculosis.
H. 68. "R.B." ... ... *(Tuberculosis of the sacrum.)*	Pus from sacral abscess	190 days	1·0 mg.	1986	370	370	Died 98 days	General tuberculosis.
			0·1 mg.	1988	320	350	Died 79 days	General tuberculosis.
H. 70. "N.W." ... ... *(Primary abdominal tuberculosis.)*	Human mesenteric gland through G.P. 1928.	50 days	1·0 mg.	1971	360	370	Died 82 days	General tuberculosis.
			0·1 mg.	1973	310	500	Died 96 days	General tuberculosis.
	Human bronchial gland	140 days	1·0 mg.	1974	340	320	Died 88 days	General tuberculosis.
			1·0 mg.	1975	390	320	Died 77 days	General tuberculosis.
			0·1 mg.	1977	310	360	Died 75 days	General tuberculosis.
H. 72. "H.C." ... ... *(Tuberculosis of a rib.)*	Pus from abscess of rib through G.P. 1945	82 days	1·0 mg.	1994	300	270	Died 44 days	General tuberculosis.
			0·1 mg.	1996	310	470	Died 122 days	General tuberculosis.
H. 74. "D.S." ... ... *(Primary abdominal tuberculosis.)*	Human mesenteric gland	77 days	1·0 mg.	2229	510	360	Died 52 days	General tuberculosis.
			0·1 mg.	2231	380	250	Died 32 days	General tuberculosis.
	Human lung through G.P. 2004	63 days	1·0 mg.	2265	320	300	Died 57 days	General tuberculosis.
	Human bronchial gland	77 days	1·0 mg.	2225	500	390	Died 58 days	General tuberculosis.
			0·1 mg.	2227	350	320	Died 5 days	Death from an acute infection.
	Human spleen	86 days	1·0 mg.	2260	330	310	Died 52 days	General tuberculosis.

GUINEAPIGS INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN—*continued.*

SLIGHTLY VIRULENT VIRUSES—*continued.*

SUBCUTANEOUS INOCULATIONS—*continued.*

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Number of Guineapig.	Weight in Grammes.		Duration of Life.	Result.
					Initial.	Final.		
H. 75. "A.H." ... ... (*Primary abdominal tuberculosis.*)	Human peritoneal fluid through G.P. 2018	99 days	1·0 mg.	2306	450	400	Died 49 days	General tuberculosis.
			0·1 mg.	2307	470	470	Died 22 days	General tuberculosis. (Injection partly intraperitoneal.)
H. 76. "G.M." ... ... (*Tuberculosis of knee-joint.*)	Human synovial membrane through G.P. 2887.	38 days	1·0 mg.	3013	270	220	Died 3 days	The cause of death was not apparent.
H. 78. "O.D." ... ... (*General tuberculosis probably primary in the cervical glands.*)	Human lung through G.P. 2123	60 days	1·0 mg.	2291	360	270	Died 51 days	General tuberculosis.
			0·1 mg.	2293	330	300	Died 80 days	General tuberculosis.
	Human bronchial gland	98 days	1·0 mg.	2322	410	400	Died 69 days	General tuberculosis.
			0·1 mg.	2324	450	450	Died 75 days	General tuberculosis.
	Human meninges through G.P. 2122 ...	77 days	0·1 mg.	2326	400	410	Died 68 days	General tuberculosis.
H. 79. "J.N." ... ... (*Tuberculosis of lung.*)	Human lung...	85 days	1·0 mg.	2328	320	250	Died 46 days	General tuberculosis.
			0·1 mg.	2330	220	150	Died 18 days	Very slight tuberculosis.
H. 80. "D.M." ... ... (*Tuberculosis of lung.*)	Human lung	81 days	0·1 mg.	2343	270	460	Died 121 days	General tuberculosis.
H. 81. "P.W." ... ... (*Tuberculosis of lung.*)	Human lung...	72 days	0·1 mg.	2341	250	400	Died 137 days	General tuberculosis.
	"	120 days	0·00001 mg.	2453	200	370	Died 188 days	General tuberculosis.
			0·00001 mg.	2454	240	150	Died 184 days	Chronic general tuberculosis.
H. 82. "G.F." ... ... (*General tuberculosis primary in the alimentary tract.*)	Human lung through G.P. 2242	81 days	1·0 mg.	2443	300	330	Died 76 days	General tuberculosis.
			0·1 mg.	2445	300	300	Died 94 days	General tuberculosis.
H. 83. "G.C." ... ... (*General tuberculosis primary in the alimentary tract.*)	Human mesenteric gland	95 days	0·1 mg.	2447	240	320	Died 120 days	Chronic general tuberculosis.
	Human bronchial gland	95 days	1·0 mg.	2449	270	300	Died 81 days	General tuberculosis.
H. 86. "C.P." ... ... (*Tuberculosis primary in the lung.*)	Human meninges through G.P. 2395 ...	57 days	1·0 mg.	2504	270	300	Died 83 days	Chronic general tuberculosis.

H. 87. "W.D." ... ... *(Tuberculosis of the suprarenal bodies.)*	Human suprarenal body through a guinea-pig.	56 days	1·0 mg.	2477	240	370	Died 244 days	Chronic general tuberculosis.
H. 93. "C.D." ... ... *(General miliary tuberculosis.)*	Human lung through G.P. 2610	78 days	1·0 mg.	2863	150	150	Died 39 days	General tuberculosis.
H. 98. "B.R." ... ... *(Tuberculous meningitis.)*	Human cerebro-spinal fluid through G.P. 2878.	49 days	1·0 mg.	2999	750	450	Died 51 days	General tuberculosis.
H. 104. "E.R." ... ... *(Tuberculosis of lungs with calcareous mesenteric glands.)*	Human lung...	51 days	1·0 mg.	3018	220	170	Died 7 days	Local tuberculosis only. The cause of death was not apparent.
			0·1 mg.	3017	240	220	Died 28 days	Early general tuberculosis insufficient to account for death.
H. 115. "N.G." ... ... *(Tuberculous meningitis.)*	Human cerebro-spinal fluid through G.P. 3087.	58 days	0·1 mg.	3265	270	280	Died 94 days	General tuberculosis.
H. 118. "F.C." ... ... *(Tuberculosis of the lung.)*	Human sputum through G.P. 3343 ...	55 days	0·1 mg.	3431	350	250	Died 58 days	General tuberculosis.
H. 119. "E.S." ... ... *(Tuberculosis of the lung.)*	Human sputum through G.P. 3439 ...	19 days	0·1 mg.	3620	550	420	Died 55 days	General tuberculosis.
H. 120. "B.W." ... ... *(Tuberculosis of the lung.)*	Human sputum through G.P. 3442 ...	22 days	0·1 mg.	3622	500	300	Died 77 days	General tuberculosis.
H. 121. "E.A." ... ... *(Tuberculosis of the lung.)*	Human sputum through G.P. 3445 ...	28 days	0·1 mg.	3632	500	350	Died 57 days	General tuberculosis.
H. 122. "F.P." ... ... *(Tuberculosis of the lung.)*	Human sputum through G.P. 3446 ...	22 days	0·1 mg.	3624	450	320	Died 33 days	General tuberculosis.
H. 123. "W.W." ... ... *(Tuberculosis of the lung.)*	Human sputum through G.P. 3450 ...	25 days	0·1 mg.	3636	470	320	Died 68 days	General tuberculosis.
H. 124. "M.M." ... ... *(Tuberculosis of the lung.)*	Human sputum through G.P. 3452 ...	27 days	0·1 mg.	3638	450	250	Died 44 days	General tuberculosis.
H. 125. "A.P." ... ... *(Tuberculosis of the lung.)*	Human sputum through G.P. 3454 ...	24 days	0·1 mg.	3634	670	400	Died 52 days	General tuberculosis.
H. 126. "A.W." ... ... *(Tuberculosis of the lung.)*	Human sputum through G.P. 3456 ...	27 days	0·1 mg.	3639	250	200	Died 35 days	Early general tuberculosis insufficient to account for death.
H. 129. "T.M." ... ... *(Tuberculosis of the lung.)*	Human sputum through G.P. 3479 ...	33 days	0·1 mg.	3662	470	250	Died 39 days	General tuberculosis.
H. 130. "N.B." ... ... *(Tuberculosis of the lung.)*	Human sputum through G.P. 3481 ...	29 days	0·1 mg.	3650	550	450	Died 91 days	General tuberculosis.
H. 131. "M.H." ... ... *(Tuberculosis of the lung.)*	Human sputum through G.P. 3483 ...	29 days	0·1 mg.	3652	600	520	Died 61 days	General tuberculosis.

GUINEAPIGS INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN—*continued.*

SLIGHTLY VIRULENT VIRUSES—*continued.*

SUBCUTANEOUS INOCULATIONS—*continued.*

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Number of Guineapig.	Weight in Grammes.		Duration of Life.	Result.
					Initial.	Final.		
H. 132. "O.O." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3485	29 days	0·1 mg.	3654	400	300	Died 52 days	General tuberculosis.
H. 133. "P.K." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3449	27 days	0·1 mg.	3739	320	220	Died 36 days	General tuberculosis.
	" "	58 days	0·1 mg.	3766	390	200	Died 40 days	General tuberculosis (not severe).
H. 134. "K.K." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3489	32 days	0·1 mg.	3646	820	520	Died 44 days	General tuberculosis.
H. 135. "E.E." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3491	28 days	0·1 mg.	3648	800	400	Died 51 days	General tuberculosis.
H. 136. "X.B." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3522	36 days	0·1 mg.	3710	550	350	Died 51 days	General tuberculosis.
H. 137. "O.B." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3524	27 days	0·1 mg.	3674	400	270	Died 50 days	General tuberculosis.
H. 138. "C.C." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3526	25 days	0·1 mg.	3666	350	200	Died 42 days	General tuberculosis.
H. 139. "K.H." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3529	25 days	0·1 mg.	3668	470	300	Died 44 days	General tuberculosis.
H. 140. "J.J." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3607	28 days	0·1 mg.	3733	390	290	Died 51 days	General tuberculosis.
H. 141. "C.H." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3532	27 days	0·1 mg.	3676	600	300	Died 57 days	General tuberculosis.
H. 142. "Q.H." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3534	28 days	0·1 mg.	3670	470	250	Died 47 days	General tuberculosis.
H. 143. "L.L." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3536	28 days	0·1 mg.	3682	650	300	Died 47 days	General tuberculosis.

H. 144. "D.B." ... ... *(Tuberculosis of the lung.)*	Human sputum through G.P. 3614 ...	33 days	0·1 mg.	3741	650	400	Died 49 days	General tuberculosis.
H. 145. "G.W." ... ... *(Tuberculosis of the lung.)*	Human sputum through G.P. 3540 ...	28 days	0·1 mg.	3684	570	370	Died 37 days	General tuberculosis.
H. 147. "P.C." ... ... *(Tuberculosis of the lung.)*	Human sputum through G.P. 3832 ...	82 days	1·0 mg.	3934	400	370	Died 122 days	Chronic general tuberculosis.
			1·0 mg.	3935	350	370	Died 151 days	Chronic general tuberculosis.
			1·0 mg.	3936	350	200	Died 46 days	General tuberculosis.
			1·0 mg.	3937	300	250	Died 90 days	General tuberculosis.
			1·0 mg.	3938	400	300	Died 103 days	Chronic general tuberculosis.
			1·0 mg.	3939	350	200	Died 70 days	General tuberculosis.
			1·0 mg.	3940	370	300	Died 71 days	General tuberculosis.
			1·0 mg.	3941	320	250	Died 61 days	General tuberculosis.
			1·0 mg.	3942	350	270	Died 102 days	General tuberculosis (not severe).
			1·0 mg.	3943	300	200	Died 49 days	General tuberculosis.

MIXED VIRUS.

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Number of Guinea-pig.	Mode of Inoculation.	Weight in Grammes.		Duration of Life.	Result.
						Initial.	Final.		
H. 90. "I.P." ... *(Primary abdominal tuberculosis.)*	Human retroperitoneal gland	94 days	1·0 mg.	2669	Intraperitoneal	250	200	Died 29 days	General tuberculosis.
			1·0 mg.	2670	Subcutaneous	270	340	Died 85 days	General tuberculosis.

INOCULATION EXPERIMENTS ON THE RHESUS MONKEY AND CHIMPANZEE.

RHESUS MONKEYS INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN.

VIRULENT VIRUS.

SUBCUTANEOUS INOCULATIONS.

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milligrammes.	Number of Monkey.	Duration of Life.	Result.
H. 127. "R.R." (*a*) ... ... (*Tuberculosis of the lung.*)	Human sputum through G.P. 3475 ...	120 days	1·0 mg.	337	Died 27 days	General tuberculosis, severe.
			1·0 mg.	339	Died 43 days	General tuberculosis, severe.

SLIGHTLY VIRULENT VIRUSES.

SUBCUTANEOUS INOCULATIONS.

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milligrammes.	Number of Monkey.	Duration of Life.	Result.
H. 74. "D.S." ... ... (*Primary abdominal tuberculosis.*)	Human lung through G.P. 2004	63 days	10·0 mg.	91	Died 30 days	General tuberculosis.
			1·0 mg.	89	Died 35 days	General tuberculosis.
			0·1 mg.	87	Died 54 days	General tuberculosis.
			0·001 mg.	85	Died 54 days	General tuberculosis.
H. 76. "G.M." ... ... (*Tuberculosis of kneejoint.*)	Human synovial membrane through G.P. 2887.	224 days	1·0 mg.	227	Died 30 days	General tuberculosis.
			1·0 mg.	229	Died 30 days	General tuberculosis.
H. 81. "P.W." ... ... (*Tuberculosis of lung.*)	Human lung	120 days	1·0 mg.	95	Died 45 days	General tuberculosis.
			0·001 mg.	97	Died 48 days	General tuberculosis.
			0·00001 mg.	99	Died 49 days	General tuberculosis.
H. 104. "E.R." ... ... (*Tuberculosis of lungs with calcareous mesenteric glands.*)	Human lung	80 days	1·0 mg.	159	Died 12 days	Local lesion only. Cause of death not apparent.
			0·01 mg.	161	Died 32 days	General tuberculosis.
H. 118. "F.C." ... ... (*Tuberculosis of the lung.*)	Human sputum through G.P. 3343 ...	55 days	1·0 mg.	263	Died 36 days	General tuberculosis.
H. 133. "P.K." ... ... (*Tuberculosis of the lung.*)	Human sputum through G.P. 3449 ...	58 days	1·0 mg.	329	Died 25 days	General tuberculosis.
			1·0 mg.	331	Died 30 days	Slight general tuberculosis, insufficient to account for death.

CHIMPANZEE INOCULATED WITH CULTURE OF TUBERCLE BACILLI OF HUMAN ORIGIN.

SLIGHTLY VIRULENT VIRUS.

SUBCUTANEOUS INOCULATION.

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milligrammes.	Number of Chimpanzee.	Duration of Life.	Result.
H. 81. "P.W." ... (*Tuberculosis of lung.*)	Human lung	120 days	0·00001 mg.	7	Died 92 days	General tuberculosis. There was a soft caseous tumour at the seat of inoculation, and the adjacent axillary glands were large, fused together, caseous and softened throughout. The right lung was firmly adherent to the pleurae ; the adhesions were fibrous, and contained caseous foci. This lung was deeply congested and firm and contained scattered caseous nodules. The left lung was lightly adherent to the chest wall ; it was very oedematous and congested, and contained an occasional caseous nodule. The thoracic glands were enlarged and showed a varying amount of caseation and softening. There was slight tuberculous peritonitis. The spleen was enlarged and contained a moderate number of irregular caseous and softened nodules ; the liver was slightly enlarged and showed also a moderate number of irregular caseous nodules ; each kidney contained three. Many of the abdominal glands showed varying degrees of caseation and softening. The small intestine showed a small clean circular ulcer.

INOCULATION EXPERIMENTS ON THE PIG GOAT, AND HORSE.

PIGS INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN.

SLIGHTLY VIRULENT VIRUSES.

SUBCUTANEOUS INOCULATIONS.

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Number of Pig.	Weight in Kilos.		Duration of Life.	Result.
					Initial.	Final.		
H. 87. "W.D."... (*Tuberculosis of the suprarenal bodies.*)	Human suprarenal through a guinea-pig.	68 days	50·0 mg.	**91**	54·42	85·71	Killed 100 days	Local tuberculosis and a few tubercles in the lungs. At the seat of inoculation there was a small cyst with soft caseous contents. The adjacent inguinal and precrural glands contained discrete caseous nodules and tubercles. On the surface of the lungs under the pleura there were a few scattered tubercles and two small groups of nodules up to 2 mm. in diameter, the majority with caseous gritty centres, the others translucent throughout.
			40·0 mg.	**95**	58·06	93·85	Killed 104 days	Local tuberculosis. There was a small tumour at the seat of inoculation composed of soft pultaceous material in a thin fibrous capsule. The adjacent inguinal and precrural glands contained a few small soft caseous gritty nodules; one ventral mediastinal gland showed a few caseo-calcareous tubercles. There was no sign of tuberculosis elsewhere.
H. 93. "C.D." ... (*General miliary tuberculosis.*)	Human lung through G.P. 2610.	78 days	100·0 mg.	**113**	15·86	65·30	Killed 253 days	Local tuberculosis and a few disseminated lesions. There was a puckered scar and a small patch of fibrous tissue containing scattered caseo-calcareous tubercles at the seat of inoculation; an enlarged right inguinal gland contained a caseo-calcareous mass and a ventral mediastinal gland was wholly caseo-calcareous. There were sparsely scattered calcareous tubercles in the lungs and one calcareous focus in a bronchial gland.
			50·0 mg.	**111**	15·86	77·56	Killed 252 days	Local tuberculosis and a few tubercles in the lungs. There were small scattered caseous nodules in and around a patch of scar tissue at the site of inoculation; an enlarged right inguinal gland was wholly caseous, and a ventral mediastinal gland partly caseous; there were sparsely scattered small calcified tubercles in the lungs (smear a few T.B.).

GOATS INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN.
SLIGHTLY VIRULENT VIRUSES.
SUBCUTANEOUS INOCULATIONS.

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Number of Goat.	Weight in Kilos.		Duration of Life.	Result.
					Initial.	Final.		
H. 79. "J.N." ... (*Tuberculosis of lung.*)	Human lung	335 days	100·0 mg.	59 (Adult Female)	38·10	38·55	Killed 106 days	Slight generalised tuberculosis. There was a scar at the site of inoculation and the subcutaneous tissues adjacent to it were beset with caseo-calcareous tubercles. The left prescapular gland was mainly occupied by a firm caseous slightly gritty mass. One miliary tubercle was seen in the liver, and there were a few small grey tubercles in the kidneys. The mesenteric and ileo-colic glands contained caseous slightly gritty patches or caseous tubercles. One iliac gland contained a caseous gritty patch, and one submaxillary gland a caseous focus.
H. 98. "B.R." ... (*Tuberculous meningitis.*)	Human cerebro-spinal fluid through G.P. 2878.	131 days	10·0 mg.	69 (Adult Female)	35·38	34·93	Killed 114 days	Local lesion, and tuberculosis of the mamma. There was a small softened caseous encapsuled mass at the seat of inoculation; the adjacent prescapular gland was normal. The right half of the mamma was larger than the left; its tissue was very tough and fibrous and beset with shotty miliary tubercles with fibrous margins and calcareous or caseous centres; there was also a caseo-calcareous nodule the size of a wheat grain. The left half of the mamma was similar, but the tubercles were not so numerous. The supramammary glands were enlarged and oedematous; a guinea-pig inoculated with an emulsion of one of them became tuberculous.
H. 118. "F.C." ... (*Tuberculosis of the lung.*)	Human sputum through G.P. 3343.	84 days	25·0 mg.	77	34·00	29·48	Killed 116 days	Local tuberculosis, and slight tuberculosis of lungs. There was a fibro-caseous ulcerated tumour at the seat of inoculation, and the left prescapular gland was enlarged and contained scattered caseo-calcareous nodules; several similar nodules were seen in loose connective tissue at one extremity of the gland. One left cervical and the right prescapular gland contained each a few caseo-calcareous tubercles. In the lungs under the pleura sparsely scattered caseous gritty miliary tubercles were seen, and also an occasional grey tubercle with a caseo-calcareous centre.
INTRAVENOUS INOCULATION.								
H. 115. "N.G." ... (*Tuberculous meningitis.*)	Human cerebro-spinal fluid through G.P. 3087.	164 days	2·0 mg.	81 (Adult Female)	34·45	25·40	Died 41 days	Tuberculosis of the lungs and thoracic glands. There was a small collection of caseo-pus in the muscles near the jugular vein at the seat of inoculation. The greater part of the lungs was firm and airless showing greyish areas surrounded by reddish tissue, many of the areas having ill defined yellowish centres. The rest of the lungs was air-containing, and closely beset with almost transparent miliary tubercles. The thoracic glands were much enlarged and composed of reddish tissue mottled with small translucent grey areas. There were no tuberculous lesions elsewhere in the body.

HORSE INOCULATED WITH A CULTURE OF TUBERCLE BACILLI OF HUMAN ORIGIN.

SLIGHTLY VIRULENT VIRUS.

SUBCUTANEOUS INOCULATION.

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Number of Horse.	Age.	Duration of Life.	Result.
H. 81. "P.W." ... ... (*Tuberculosis of lungs.*)	Human lung	227 days	50·0 mg.	1	18 or more years.	Killed 116 days	Local tuberculosis. There was a series of small softened caseous nodules in the subcutaneous tissues at the seat of inoculation, a pea sized caseous nodule in one of the left prescapular glands, and no tuberculosis elsewhere.

INOCULATION EXPERIMENTS ON THE DOG AND CAT.

DOGS INOCULATED WITH EMULSIONS OF TISSUES.

SLIGHTLY VIRULENT VIRUSES.

Virus.	Source of Emulsion.	Dose.	Mode of Inoculation.	Number of Dog.	Duration of Life.	Result.
H. 67. "E.P." ... ... (*Multiple tuberculosis of bones.*)	Calf 1169 (prescapular gland).	Estimated dose : 17,260,000 T.B.	Intraperit.	23 (Puppy).	Killed 111 days	On the floor of the abdomen at the seat of inoculation there was a small tough whitish nodule. In the left lung there was a group of 20 translucent miliary tubercles ; the liver showed sparsely scattered grey miliary tubercles and a few larger ones, yellow and gritty. The pyloric gland contained two small white foci.
H. 80. "D.M." ... ... (*Tuberculosis of lung.*)	Human lung	Estimated dose : 97,500,000 T.B.	Intraperit.	19 (Puppy).	Killed 140 days	Slight general tuberculosis. Omentum and peritoneum normal. The lungs showed fairly numerous small translucent homogeneous fibrous tubercles. There were fairly numerous soft yellow miliary tubercles in the liver, many containing calcareous grains, and in the right kidney a small grey wedge shaped tubercle was seen. Many of the abdominal glands were affected, showing softening caseo-necrotic gritty patches or scattered opaque foci. T.B. were numerous in smears from the affected glands and a lung tubercle : none was seen in a liver tubercle or in a scraping from the spleen.
		Estimated dose : 97,500,000 T.B.	Intraperit.	21 (Puppy).	Killed 165 days	Slight general tuberculosis. In the subperitoneal tissues at the seat of inoculation there was a walnut sized fibro-caseous tumour. On the mesentery three or four tubercles were seen and on the peritoneal surface of the liver a group of grey tubercles and some patches of greyish yellow lymph. The lungs showed on the surface very numerous small grey tubercles in many places confluent ; a few only were caseous in the centre ; similar tubercles were less numerous in the depth. Five tubercles were seen in the heart, one as large as a hemp seed. Each kidney showed two small grey tubercles on the surface and several in the depth. T.B. were found in tubercles from the lung and heart.
	Tuberculous tissues from G.P.'s 2391–4 infected from Calf 1141.	10·0 cc. of emulsion. T.B. not very numerous.	Intraperit.	39 (Puppy).	Killed 35 days (when apparently well).	Early general tuberculosis, moderately severe. The omentum was thickened ; the peritoneum presented fairly numerous grey tubercles. The lungs (crepitant) contained sparsely scattered miliary tubercles with caseous centres. The spleen was peppered with minute grey points, the liver closely beset with translucent grey tubercles ; each kidney contained a few grey miliary tubercles. The sternal and many abdominal glands showed patches of early caseation. T.B. were found in smears from the liver and spleen, and were numerous in an emulsion made from various tuberculous tissues.
			Intraperit.	41 (Puppy).	Killed 36 days (when apparently well).	Early general tuberculosis, not severe. The omentum was moderately thickened, the peritoneum showed sparsely scattered, grey tubercles. The lungs contained very sparsely scattered small grey tubercles the larger with caseous centres. The liver was moderately closely beset with grey tubercles ; one was seen in the right kidney. Many abdominal glands were slightly enlarged but were not definitely tuberculous. T.B. were found in the liver and in an emulsion made from various tuberculous tissues.

DOGS INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN.

SLIGHTLY VIRULENT VIRUSES.

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Mode of Inoculation.	Number of Dog.	Duration of Life.	Result.
H. 70. "N.W." ... (*Primary abdominal tuberculosis.*)	Human lung	260 days	10·0 mg.	Subcut.	25 (Puppy).	Killed 143 days	There were two small scars in the skin of the abdomen at the seat of inoculation. All the organs and glands were normal.
			10·0 mg.	Intraperit.	27 (Puppy).	Died 61 days	General tuberculosis. The omentum formed a large fibro-caseating tumour and there were fairly numerous grey tubercles and some large tuberculous masses on the peritoneum. The peritoneal and thoracic cavities were filled with serous fluid. The lungs were collapsed and deeply congested and contained fairly numerous grey miliary tubercles. There were extremely numerous small grey tubercles in the liver and a few in each kidney. The abdominal and thoracic glands were enlarged and showed varying degrees of caseation. T.B. were found in all the organs and glands examined, and in the bone marrow.
			10·0 mg.	Intraperit.	29 (Adult).	Killed when very ill 413 days	General tuberculosis. The great omentum contained a tumour the size of a small orange composed of masses of caseo-necrotic substance divided by fibrous trabeculæ ; in the small omentum there was a small tumour similar in structure. The pyloric gland was enlarged and fibro-caseous. Small scattered tubercles were seen in the cortex of each kidney : there were none in the liver and spleen, but a few flat greyish growths were seen on the surface of the latter. The right pleural cavity was distended with straw-coloured fluid (smear, no T.B.) in which there were a few yellow flakes and a fibrino-purulent mass, and there were small patches of pus on the pleura (smear, T.B. numerous). The pericardium was filled with fluid and there was some in the left pleural cavity. The right lung was almost entirely collapsed and airless : it contained three caseous masses, the largest 1·5 cm. in diameter (smear, T.B. very numerous). The left lung was congested and oedematous but air-containing : it showed one caseous mass (1·5 cm.) and two small tubercles. The thoracic glands were normal.
H. 79. "J.N." ... (*Tuberculosis of lung.*)	Human lung	85 days	50·0 mg.	Intraperit.	31 (Young Adult).	Died 31 days	General tuberculosis. The omentum was thickened and honeycombed with spaces containing greenish pus, the parietal peritoneum was finely granular in appearance, and the mesentery and meso-colon were speckled with minute grey points. The peritoneal cavity contained 800 cc. of serous fluid. The lungs were slightly congested and collapsed normally ; they contained moderately numerous greyish submiliary tubercles. The heart muscle showed scattered minute grey foci. The spleen was enormously enlarged and closely peppered with minute grey points ; the liver was soft and yellow and showed numerous similar points on the surface, and the kidneys showed a few. The sternal and most of the abdominal glands were enlarged and showed varying degrees of caseation. The submaxillary and pharyngeal glands contained scattered yellow tubercles : the mesenteric glands numerous yellow foci. T.B. were numerous in all organs and glands examined, and in the blood and bone marrow.

DOGS INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN—*continued.*

SLIGHTLY VIRULENT VIRUSES—*continued.*

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Mode of Inoculation.	Number of Dog.	Duration of Life.	Result.
H. 79. "J.N."—*continued.*	Human lung	85 days	50·0 mg.	Intraperit.	33 (Puppy).	Died 32 days	General tuberculosis. The omentum formed a large tumour composed of necrotic patches set in translucent tissue, and the peritoneum showed fairly numerous minute tubercles; there were also some rather large nodules containing yellow foci on the mesentery and mesocolon. The peritoneal cavity contained a large quantity of clear fluid. The lungs (crepitant) were moderately closely beset with small grey tubercles. The spleen showed patches of necrosis under the capsule and scattered yellowish or grey foci in the depth; the liver was very closely beset with minute grey tubercles, and there were two or three in each kidney. The thoracic and abdominal glands were enlarged and caseated to a greater or less extent. T.B. were found in all organs and glands examined and in the marrow; none were seen in the blood.
H. 81. "P.W." ... (*Tuberculosis of lung.*)	Human lung	190 days	1·0 mg.	Intravenous	43 (Puppy).	Died 33 days	Early general tuberculosis. Death was immediately due to a ruptured bloodvessel in the omentum; there was a great excess of bloodstained peritoneal fluid. The lungs were air-containing and showed everywhere numerous small grey tubercles with opaque centres, sometimes confluent. The bronchial and portal glands were in an early state of caseation. The spleen was very large and showed numerous soft opaque points and foci. In the heart muscle there was a single tubercle. No definite tubercles were seen in other organs. T.B. were numerous in the liver, spleen, and affected glands; none were seen in smears from a kidney or a suprarenal.

CATS INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN.

VIRULENT VIRUS.

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Mode of Inoculation.	Number of Cat.	Age and Weight.	Duration of Life.	Result.
H. 69. "F.K." (*Primary abdominal tuberculosis.*)	Human meninges through G.P. 1924.	153 days	1·0 mg.	Intraperit.	11	Adult 2900 gr.	Died 17 days	Acute tuberculosis. The omentum was not retracted and showed only a few yellow tubercles. The peritoneum was normal. The lungs were firm and congested but showed no

								definite tubercles. In the liver a large firm yellow nodule was seen projecting slightly from the surface. Two tubercles were seen in the left kidney and a doubtful focus in the right. The ventral mediastinal glands were enlarged and showed patches of necrosis. T.B. were numerous in smears from the lung, liver, and spleen.
			1·0 mg.	Subcut.	**13**	Adult 2350 gr.	Killed 36 days (when ill).	General tuberculosis. At the seat of inoculation there was a large ulcer and the inguinal and sternal glands were much enlarged and caseo-necrotic. The lungs were closely beset with small grey tubercles and showed also a few larger caseous nodules; there were no consolidated areas. The bronchial glands were slightly enlarged. The spleen was much enlarged and closely beset with small greyish yellow tubercles, and showed also numerous larger nodules. Very numerous miliary tubercles were seen in the liver and the portal gland was beset with caseous nodules. One coeliac gland was similarly affected. The kidneys showed no macroscopic tubercles. The iliac glands were enlarged and contained a few caseous foci. The axillary glands were enlarged; the submaxillary and cervical glands contained caseous patches or foci. The remaining lymphatic glands were normal. The thyroid body showed two tubercles. T.B. were numerous in the faeces, and a few were found in a smear from the bone marrow.

MIXED VIRUS.

H. 13. "A.D." (*Tuberculous meningitis and general tuberculosis.*)	Thoracic gland of Calf 301 (1st passage).	3 years	20·0 mg.	Intraperitoneal.	**15**	Adult 3,270 gr.	Died 15 days	Acute tuberculosis. There was a small caseous nodule in the abdominal wall; in the omentum there was one large patch of friable necrotic substance and two small ones; the peritoneum was normal. The spleen was apparently a little enlarged, and the Malpighian bodies were conspicuous (smear, no T.B.); the liver contained very numerous small grey tubercles (smear, T.B. numerous). Many abdominal glands were enlarged and congested, and one mesenteric gland contained a yellow focus. The lungs were collapsed and dark red, and the lobes were glued together; no tubercles were seen. The pleura, both parietal and visceral, was covered with fibrino-purulent lymph (T.B. extremely numerous). The ventral mediastinal glands were enlarged and caseo-necrotic, and the tissues around them were infiltrated and necrotic; between the muscles and the sternum there was a layer of caseo-pus. The bronchial glands were enlarged and haemorrhagic.
			20·0 mg.	Intraperitoneal.	**17**	Adult 1,150 gr.	Killed when dying 12 days.	Acute tuberculosis. There was a small collection of soft yellow necrotic substance in the subcutaneous tissues at the seat of inoculation; the peritoneal cavity was partly filled with serous fluid; the omentum was thickened, and composed of yellow necrotic substance and small islands of grey translucent tissue; the peritoneum had a thin covering of fibrinous lymph. The spleen was speckled with minute grey foci; the lungs were perhaps slightly congested, but otherwise appeared normal; the sternal and portal glands were enlarged and caseated. Other organs and glands appeared normal. Smears from the liver, spleen, and bone marrow showed numerous T.B.

CATS INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN—*continued*

SLIGHTLY VIRULENT VIRUSES.

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Mode of Inoculation.	Number of Cat.	Age and Weight.	Duration of Life.	Result.
H. 70. "N.W." (*Primary abdominal tuberculosis.*)	Human lung	260 days	50·0 mg.	Subcut.	25	Adult 2200 gr.	Died 29 days	Local tuberculosis. T.B. in organs. Death was apparently due to toxaemia. There was a large firm flattened caseous and partly softened tumour at the seat of inoculation (between the scapulae), the skin over which was honeycombed with ulcers and covered with dried caseo-pus; the adjacent glands were enlarged and caseous. All the organs and the other glands appeared normal, but T.B. were found in smears from the lung, spleen, liver, kidney, and a mesenteric gland, none in a suprarenal.
	Human lung	260 days	50·0 mg.	Intraperit.	29	Adult 3450 gr.	Died 77 days	Local tuberculosis, few tubercles in lungs. The amount of tuberculosis was not sufficient to account for death. The omentum was retracted and moderately thickened; it was tough and yellowish-white on section. The peritoneum was normal. The lungs (crepitant) showed scattered grey translucent tubercles most numerous in the caudal lobes, and here and there aggregated together. In one caudal lobe there was also a thin disc-like caseo-fibrous nodule (1 cm. in diameter).
			10·0 mg.	Intraperit.	27	Adult 2350 gr.	Killed 86 days (when ill).	Local tuberculosis only. There were no tubercles on the omentum or peritoneum; lightly attached to the wall of the small intestine there was a caseo-necrotic mass the size of a thrush's egg (? inoculum). No tubercles were seen in the organs, but a smear from the spleen revealed 2 T.B.
H. 74. "D.S." (*Primary abdominal tuberculosis.*)	Human lung through G.P. 2004.	63 days	1·0 mg.	Subcut.	19	Kitten 400 gr.	Died 7 days	At the seat of inoculation there was a small caseous lesion. The cause of death was not determined.
			0·1 mg.	Subcut.	21	Kitten 380 gr.	Died 2 days	No tuberculosis. Pneumonic patches were seen in the lungs.
			0·01 mg.	Subcut.	23	Kitten 500 gr.	Died 72 days	A group of three or four small firm caseating nodules was seen at the seat of inoculation; the adjacent glands were normal. The liver was beset with greyish-white translucent pinhead tubercles (no T.B. were seen in a smear preparation). There was no disease elsewhere.
H. 75. "A.H." (*Primary abdominal tuberculosis.*)	Human peritoneal fluid through G.P. 2018.	99 days	10·0 mg.	Subcut.	33	Adult 1750 gr.	Killed 98 days	Local tuberculosis. At the seat of inoculation there was a small flat fibro-caseous lesion. A small right inguinal gland was caseous in the centre (T.B. numerous). In one kidney a doubtful tubercle was seen. There was no tuberculosis elsewhere.
			10·0 mg.	Intraperit.	31	Adult 2050 gr.	Died 94 days	Tuberculosis of lungs only. The cause of death was not apparent. The omentum and peritoneum were normal. The lungs showed on the surface numerous small greyish-yellow nodules; along the dorsal borders of the caudal lobes there was a band of similar tissue; in the substance similar but smaller and less numerous nodules were found (a few T.B. were seen in a smear preparation). Other organs and all the glands were normal.
H. 79. "J.N." (*Tuberculosis of lung.*)	Human lung	85 days	50·0 mg.	Intraperit.	37	Adult 2150 gr.	Died 56 days	Slight general tuberculosis. The cause of death was not apparent. In the subperitoneal tissues at the seat of inoculation there was a caseating patch; the omentum was not contracted but showed a network of grey lines. The lungs (crepitant) showed on the surface seven caseous nodules up to a pea in size; scattered tubercles and foci were seen elsewhere in the lung and also a patch of confluent grey tubercles; none were seen on section. In the

								liver there was a large yellow caseous and softened mass (1 × 1·5 cm.). Each kidney showed grey miliary tubercles on the surface and a few caseating nodules and streaks in the depth ; the right also showed two small wedge shaped caseating nodules in the cortex. The spleen was dark red and firm but showed no definite tubercles. T.B. were found in the liver, spleen, and in foci and nodules from the lung, and in a sternal gland.
H. 81. "P.W." *(Tuberculosis of lung.)*	Calf 1145 (prescapular gland)	83 days	50·0 mg.	Intraperit.	45	Adult 3050 gr.	Died 84 days	Spontaneous tuberculosis. In the abdominal wall at the seat of inoculation there was a small caseous mass. The omentum was not thickened but was adherent to the spleen. The lungs were collapsed ; half the right caudal lobe was occupied by softening fibro-caseous patches and in the left caudal lobe there were nodules of similar tissue ; elsewhere in the lung a few grey tubercles were found. One mesenteric gland was enlarged and extensively caseous. There was no tuberculosis elsewhere. T.B. were numerous in the lung and the mesenteric gland.
			10·0 mg.	Subperit.	47	Adult 2500 gr.	Died 74 days	Local lesion only. In the subperitoneal tissues at the seat of inoculation there was a cyst larger than a pigeon's egg containing softening caseous substance ; there was no tuberculosis elsewhere.
H. 98. "B.R." *(Tuberculous meningitis.)*	Human cerebro-spinal fluid through G.P. 2878.	131 days	1·0 mg.	Subcut.	53	Kitten 850 gr.	Died 8 days	The cause of death was not apparent.
			1·0 mg.	Subcut.	57	Kitten 800 gr.	Died 12 days	Death from pneumonia. There was a small caseous abscess at the seat of inoculation and no tuberculosis elsewhere.
			1·0 mg.	Intra-muscular.	55	Kitten 1000 gr.	Killed 88 days	In the muscle wall of the abdomen there was a mass of yellow caseous substance. All the organs and glands were normal.
			Rather less than 1·0 mg.	Intraperit.	59	Kitten 870 gr.	Died 23 days	There were no visible tuberculous lesions ; a few T.B. were seen in smears from the liver, lung and spleen. The cause of death was not apparent.
H. 140. "J.J." *(Tuberculosis of the lung.)*	Human sputum through G.P. 3607.	89 days	1·0 mg.	Intraperit.	61	Kitten 800 gr.	Killed 162 days	There was a moderate number of minute transparent tubercles in the omentum and no tuberculosis elsewhere.
			1·0 mg.	Intraperit.	63	Kitten 800 gr.	Killed 162 days	
			1·0 mg.	Subcut.	65	Kitten 800 gr.	Killed 162 days	There was a small cavity containing gritty caseo-pus at the seat of inoculation and no tuberculosis elsewhere.
			1·0 mg.	Subcut.	67	Kitten 800 gr.	Killed 162 days	There was a fibro-caseo-calcareous mass at the seat of inoculation and no sign of tuberculosis elsewhere.
H. 143. "L.L." *(Tuberculosis of the lung.)*	Human sputum through G.P. 3536.	141 days	10·0 mg.	Intraperit.	69	Kitten 1250 gr.	Killed 146 days	No tuberculosis.
			10·0 mg.	Intraperit.	71	Kitten 1020 gr.	Killed 146 days	No tuberculosis.

INOCULATION EXPERIMENTS ON THE RAT, MOUSE AND HEDGEHOG.

RATS AND MICE INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN.

SLIGHTLY VIRULENT VIRUSES.

Virus.	Immediate Source of Culture.	Duration of Artificial Cultivation.	Dose in Milli-grammes.	Mode of Inoculation.	Number of Animal.	Weight in Grammes.		Duration of Life.	Result.
						Initial.	Final.		
					RATS.				
H. 70. "N.W." (*Primary abdominal tuberculosis.*)	Human bronchial gland	140 days	10·0 mg.	Subcutaneous	**48**	280	170	Died 74 days	Local tuberculosis. Tubercle bacilli in organs. Death was apparently due to impaction of faeces in the large intestine. There was a linear ulcer at the seat of inoculation; the floor was clean and showed no caseous deposit. The adjacent inguinal glands were normal in appearance; fairly numerous T.B. were seen in a smear from one of them. A few T.B. were seen in a smear from the spleen, and T.B. in clumps in a smear from the lung; none was seen in a smear from the liver.
			10·0 mg.	Intraperitoneal and partly Subcutaneous.	**49**	380	200	Died 53 days	Acute tuberculosis. There was a small collection of caseo-pus in the subcutaneous tisues at the seat of inoculation and the omentum contained several grey tubercles. The spleen was enlarged, firm, and dark red. The lungs were voluminous, but crepitant, their surfaces were mottled with light grey areas or foci surrounded by congested lung tissue. Other organs and the glands appeared normal. Smears from the lung, liver, and spleen showed numerous T.B.
H. 81. "P.W." (*Tuberculosis of lung.*)	Human lung	81 days	10·0 mg.	Subcutaneous	**55**	150	140	Died 454 days	There were no macroscopic tuberculous lesions, and no apparent cause for death. Smears from the gland adjacent to the site of inoculation and from the spleen showed no T.B.; in a smear from the lung a moderate number of T.B. was seen.
			10·0 mg.	Intraperitoneal	**54**	230	130	Died 58 days	Acute tuberculosis. There was no obvious disease of the omentum or peritoneum; the spleen was firm and perhaps slightly enlarged. One lung was reddish in colour and airless, sinking in water; the other had been eaten by companion rats. Other organs and the glands appeared normal. Smears from the lung, liver, and spleen showed numerous T.B.; in a smear from the kidney none was seen.

MICE.

H. 81. "P.W." (*Tuberculosis of lung.*)	Human lung	272 days	Less than 50·0 mg.	Subcutaneous	26	—	—	Died 61 days	Local tuberculosis. T.B. in spleen. The cause of death was not apparent. There was a small collection of cheesy granular pus at the seat of inoculation, and the adjacent inguinal and iliac glands were a little enlarged, but were not caseous. The spleen appeared a little enlarged; and the lungs were slightly congested; there was no sign of tuberculosis in any of the organs. Smears were examined from the iliac gland (T.B. fairly numerous), lung (no T.B.), and spleen (a moderate number of T.B.).
			50·0 mg.	Intraperitoneal	25	—	—	Died 12 days	Acute tuberculosis. The abdominal organs were much decomposed. There were signs of peritonitis, the liver and spleen being covered by lymph; turbid fluid with whitish flocculi could be scraped from the peritoneum. The spleen was enlarged and bluish-black in colour. The lungs were collapsed, red and almost completely airless; the liver was decomposed and very friable The kidneys were normal. Microscopical examinations: T.B. were very numerous in the liver, moderately numerous in the lungs, extremely numerous in a scraping from the peritoneum. All the smears showed very numerous other micro-organisms.
H. 140. "J.J." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3607.	89 days	10·0 mg.	Intraperitoneal	35	—	—	Died 26 days	Acute tuberculosis. There was a firm mass of caseating tissue, probably omentum, along the hilum of the spleen, to which it was adherent. The spleen was enlarged and showed on the surface one pinhead-sized caseous tubercle. The lungs showed patches of congestion. The manubrial glands were enlarged and caseo-necrotic. A smear preparation from the omental mass resembled a pure culture of tubercle bacilli; T.B. were numerous in smears from the liver, spleen and lung, and extremely numerous in a smear from a manubrial gland.
			10·0 mg.	Intraperitoneal	36	—	—	Died 8 days	Acute tuberculosis. On the mesentery and the peritoneum of the lumbar regions, and between liver and diaphragm, there were several yellow thin-walled purulent nodules (up to 2·5 mm.). A smear from the contents of one resembled a pure culture of tubercle bacilli. The spleen was slightly enlarged and pale, the liver and kidneys normal in appearance; the portal gland was enlarged. The head and lungs had been eaten by a companion mouse. Smears from the spleen and liver showed numerous T.B.
			10·0 mg.	Subcutaneous	37	—	—	Died 37 days	Death from pneumonia, caused apparently by the tubercle bacillus. At the seat of inoculation there was a congested fibrous patch; the adjacent glands were normal in size; there was no naked-eye evidence of tuberculosis anywhere in the body. A moderate number of T.B. was found in a smear from the lung, none in smears from the abdominal organs.

RATS AND MICE INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN—*continued.*

SLIGHTLY VIRULENT VIRUSES—*continued.*

Virus.	Immediate Source of Culture.	Duration of Artificial Cultivation.	Dose in Milli-grammes.	Mode of Inoculation.	Number of Animal.	Weight in Grammes.		Duration of Life.	Result.
						Initial.	Final.		
					MICE—*continued.*				
H. 143. "L.L." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3536.	141 days	1·0 mg.	Intraperitoneal	39	—	—	Died 103 days	Acute tuberculosis. The omentum was slightly thickened and contained three or four yellow miliary nodules; there was a hempseed-sized softened nodule on the mesentery. The spleen was enlarged; the lungs were deeply congested and airless and showed scattered firm greyish patches. Microscopical examinations:—Lung, T.B. very numerous; Liver, a moderate number of T.B.; Spleen, a few T.B.; Nodule from mesentery, composed of beaded and vacuolated T.B.
			10·0 mg.	Subcutaneous	40	—	—	Died 103 days	No tuberculosis. Tubercle bacilli were found in smears from the inguinal gland and the lung, none in smears from the liver and spleen.

HEDGEHOG INOCULATED WITH A CULTURE OF TUBERCLE BACILLI OF HUMAN ORIGIN.

SLIGHTLY. VIRULENT VIRUS.

Virus.	Immediate Source of Culture.	Duration of Artificial Cultivation.	Dose in Milli-grammes.	Mode of Inoculation.	Number of Hedgehog.	Weight in Grammes.		Duration of Life.	Result.
						Initial.	Final.		
H. 86. "C.P." (*Tuberculosis primary in the lung.*)	Human meninges through G.P. 2395.	57 days	10·0 mg.	Subcutaneous	1	700	650	Died 55 days	General tuberculosis; death was the result of a secondary infection caused by organisms which had entered the body apparently through an abrasion on the nose. There was a large fibrous-walled cyst containing softened caseous matter at the seat of inoculation, and the adjacent glands contained in all five soft yellow tubercles. There were two cysts with caseous contents under the somatic peritoneum, and a few yellow foci and streaks on its surface. Numerous pinpoint tubercles were seen on the surface of the spleen, and four yellowish nodules the largest 2 mm. in diameter in the substance. The liver contained very numerous whitish tubercles ranging from a mere point up to 2 mm. (smear, no T.B.). The kidneys showed on the surface a moderate number of white tubercles extending as wedges into the cortex; the left showed also one wedge-shaped nodule (2 mm.) and a few tubercles in the depth. The left suprarenal showed several wedge-shaped yellowish areas (smear, T.B.). The lungs contained about half-a-dozen fibro-caseous nodules, the largest 1 cm. in diameter, and a few smaller tubercles. One bronchial gland contained a few minute tubercles, another was caseous almost throughout. One iliac gland was caseous and softened; the portal glands contained one or two opaque foci. There was a group of small yellowish tubercles in the muscle of the tongue (smear, T.B.). The intestines were normal.

EXPERIMENTS ON PARROTS AND FOWLS WITH TUBERCLE BACILLI OF HUMAN ORIGIN.

PARROTS INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN.

Virus.	Source of Culture.	Dose.	Method of Inoculation.	Number of Parrot.	Duration of Life.	Post-mortem Result.	Characters of Culture isolated from Parrot.	Result of Inoculation of Tissue Emulsions or Culture.
H. 81. "P.W." (*Tuberculosis of lung.*)	Original material (lung).	10·0 mg.	Intra-venous.	3	Died 9 days	Acute tuberculosis. The left lung was airless, dark red, and very oedematous; the right was in a similar condition except along the dorsal border where there was still some functional lung tissue. The liver was pale, the spleen a little enlarged (?). Tubercle bacilli were numerous in smears from all the chief organs.	—	—
		2·0 mg.	Intra-venous.	1	Died 20 days	General tuberculosis. The lungs were congested and very adherent to the pleura, on section small yellowish-white points were seen. The liver appeared enlarged and was very soft and showed numerous small greyish areas but no definite tubercles. The spleen was small and very soft; the kidneys appeared normal. Microscopic examination of smears:—lung, tubercle bacilli exceedingly numerous; spleen and liver, tubercle bacilli numerous; kidney, a few tubercle bacilli seen.	—	—
		0·1 mg.	Intra-venous.	5	Killed 298 days	There were a few minute grey tubercles with opaque centres in the liver (smear, no T.B.), a few minute greyish white tubercles in the kidneys and three or four yellow tubercles on the peritoneum (smear, no T.B.) only. In an emulsion of the lung a group of degenerate T.B. was seen.	—	Guinea-pig 3221 was inoculated intraperitoneally with an emulsion of the right lung and G.P. 3220 intraperitoneally with an emulsion of the spleen. The latter died prematurely in 6 days, the cause of death not being apparent, the former was killed after 43 days and showed chronic general tuberculosis.
		1·0 mg.	Intra-peritoneal.	7	Died 129 days	Tuberculous peritonitis. The membrane covering the liver and the heart was thickened and mottled with yellow foci; on one surface numerous yellow projecting tubercles were also seen. The liver was enclosed in a sac (formed partly by the above membrane) which was distended with yellow fluid and a clear jelly. The membrane lining the pleuro-peritoneal space showed a number of small yellow fatty masses which could be readily scraped away (smear: fairly numerous degenerate T.B.). There were two or three miliary caseous tubercles on the surface of the lung. In the clavicular spaces there were several small caseous masses. There was no tuberculosis elsewhere.	A culture isolated from a focus on the peritoneum grew like the culture inoculated.	—

		10·0 mg.	Intra-muscular	9	Killed 269 days	There was a dry cheesy mass surrounded by fibrous tissue at the seat of inoculation. The adjacent gland was composed of dry caseous substance (smear, a few T.B.). The liver contained numerous minute whitish tubercles (smear, no T.B.). The spleen was (?) enlarged and pale, but showed no tubercles. There were a few minute greyish-white foci in the kidneys. In the lungs, under the pleura, there were a few millet seed sized dry cheesy nodules (smear, a moderate number of T.B.). Heart—the right ventricle showed a grey patch (1 cm.) containing scattered yellow cheesy foci (smear, T.B.); on section the whole thickness of the wall was involved; around the patch there were isolated foci; in the wall of the right auricle there were several grey tubercles with minute opaque yellow centres.	A culture isolated from the liver resembled the culture inoculated.	Guinea-pig 3168 was inoculated intraperitoneally with an emulsion of spleen, and G.P. 3169 intraperitoneally with an emulsion of a piece of lung containing a tubercle. They died of general tuberculosis (mammalian in type) in 59 and 79 days respectively. Two fowls, Nos. 131 and 129, were inoculated intravenously with 40·0 and 10·0 mg. respectively of culture derived from the liver of the parrot. The former died in 51 days; the cause of death was not apparent and no tuberculous lesions were seen; the latter was killed after 267 days and showed no tuberculosis.
H. 99. "L.K." (*Lupus.*)	Original material through G.P. 2928.	[The skin was scarified with a knife dipped in a turbid suspension of culture.]	Cutaneous.	13	Died 250 days	General miliary tuberculosis. There was no local lesion at the site of the inoculation at the root of the beak. The lungs were diffusely hepatised and contained numerous miliary tubercles with caseous centres (smear, T.B. numerous). The liver was closely peppered with minute greyish-white tubercles. The spleen was slightly enlarged and showed scattered greyish-white foci beneath the capsule. There were a few miliary grey tubercles in the cortex of each kidney. No T.B. were seen in smears from the liver or spleen substance.	—	—
H. 102. "N.H." (*Lupus.*)	Original material through G.P. 2934.	[The skin was scarified with a knife dipped in a turbid suspension of culture.]	Cutaneous.	15	Killed 522 days	General tuberculosis, not severe. There was no local lesion at the site of the inoculation behind the right ear. The lungs contained half-a-dozen minute greyish white tubercles (smear, a few T.B.). The spleen was much enlarged and showed on section grey foci (? Malpighian bodies). The liver was peppered with minute greyish-white tubercles. Kidneys normal. In the pectoral muscles there were sparsely scattered whitish foci, and one pale fibroid patch containing similar foci (smear, one T.B.). No tubercle bacilli were seen in smears from the spleen and liver.	—	—

PARROTS FED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN.

Virus.	Source of Culture.	Dose.	Method of Inoculation.	Number of Parrot.	Duration of Life.	Post-mortem Result.	Characters of Culture isolated from Parrot.	Result of Inoculation of Tissue Emulsions or Culture.
H. 81. "P.W." (*Tuberculosis of lung.*)	Original material (lung).	50·0 mg.	Fed	11 (from a pipette.)	Died 73 days	On each side of the neck there was a chain of glands which contained caseous tubercles (smear, a few T.B.). The cavity of the larynx was filled with cheesy caseous substance, but the mucous membrane was not ulcerated. The space between the posterior margins of the lungs and the membrane dividing the thorax from the peritoneum was filled with cheesy masses (T.B. moderately numerous). The serous surface of the pleuro-peritoneal space on each side was covered with a layer of caseo-pus and showed also caseous masses (smear, a few T.B.). All the long recesses of the back from the last rib to the pelvis were filled with caseous substance the dorsal parts of the kidneys being completely surrounded (smear, T.B. moderately numerous). The caseous substance was of a tough leathery consistence. The right lung was dark red and almost entirely airless and contained caseous masses which were readily shelled out apparently from the bronchi ; in the red consolidated tissue small streaks were seen, (?) small bronchi plugged with secretion. The lung parenchyma contained no tubercles. The left lung was similar to the right. The liver showed minute grey foci (smear, no T.B.) and the spleen numerous minute yellow tubercles (smear, no T.B.). The intestines were normal.	—	—
H. 144. "D.B." (*Tuberculosis of the lung.*)	Human sputum through G P. 3614.	2 serum cultures on each of two successive days.	Fed	17	Killed 270 days	There was a miliary caseous tubercle in the lung (smear, T.B. in moderate number) and no sign of disease elsewhere.	—	—
H. 145. "G.W." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3540.	Do.	Fed	19	Killed 270 days	No sign of tuberculosis.	—	—

FOWLS INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN.

Virus.	Source of Culture.	Dose.	Method of Inoculation.	Number of Fowl.	Duration of Life.	Post-mortem Result.	Characters of Culture isolated from Fowl.	Result of Inoculation of Tissue Emulsions or Culture.
H. 53. "D.H." (*a*) (*Lupus.*)	Original material through G.P. 1482.	50·0 mg.	Intra-venous.	21	Died 12 days	Acute tuberculosis. No macroscopic lesions, but T.B. found in all organs. The spleen was much enlarged and ruptured.	—	—
		10·0 mg.	Intra-venous.	19	Died 14 days	Do. do.	—	—
		1·0 mg.	Intra-venous.	23	Killed 114 days	There was a grey spot in the liver (no T.B.) and a greyish-white point in the spleen. Otherwise the fowl was healthy.	—	—
		50·0 mg.	Intraperit.	31	Killed 170 days	There were two yellow foci on the omentum (smear, no T.B.). Otherwise the fowl was healthy.	—	—
		10·0 mg.	Intraperit.	29	Killed 169 days	In the liver two pinhead-sized grey tubercles with opaque centres were seen (smear, numerous T.B.). Otherwise the fowl was healthy.	—	—
		1·0 mg.	Intraperit.	27	Died 98 days	There was a minute translucent focus on the liver (no T.B.). Otherwise the fowl was free from visible lesions. A smear from the spleen showed no T.B ? Cause of death.	—	—
		50·0 mg.	Subcu-taneous.	35	Killed 172 days	There was a thin subcutaneous patch of leathery yellow substance surrounded by a fibrous capsule at the seat of inoculation. The spleen appeared enlarged: a smear from it showed no T.B. Other organs were normal.	—	—
		10·0 mg.	Intra-muscular.	33	Killed 172 days	There was a firm patch of fibroid tissue containing tough caseo-necrotic tracts in the muscle at the seat of inoculation. No sign of disease elsewhere.	A culture was isolated from the local lesion and this resembled the culture inoculated.	Fowl 61 was inoculated intramuscularly with the culture derived from the local lesion of the fowl the dose being the growth from two serum tubes. It was killed 135 days later and found to have a local lesion only.
		10·0 mg.	Intra-venous.	85	Died 207 days	No sign of tuberculosis. Emulsions of lung and spleen showed no T.B.	—	—
H. 85. "H.B." (*Lupus.*)	Original material through G.P. 2365.	10·0 mg.	Intra-venous.	77	Killed 146 days	No sign of tuberculosis.	—	G.P. 3104 was inoculated with an emulsion made from the spleen; it died of G.T. in 49 days.
		1·0 mg.	Intra-venous.	75	Killed 146 days	No sign of tuberculosis. Smears—Lung, no T.B. Spleen, no T.B.	—	—
H. 91. "H.S." (*Lupus.*)	Original material through G.P. 2590.	10·0 mg.	Intra-venous.	79	Killed 239 days	There were scattered minute greyish-yellow foci in the small intestine (smear, no T.B.). There was no sign of tuberculosis.	—	G.P. 3268 was inoculated intraperitoneally with an emulsion of the lung. It was killed after 74 days and showed caseation of the portal gland and three or four grey tubercles in the spleen and no tuberculosis elsewhere.

FOWLS INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN—*continued.*

Virus.	Source of Culture.	Dose.	Method of Inoculation.	Number of Fowl.	Duration of Life.	Post-mortem Result.	Characters of Culture Isolated from Fowl.	Result of Inoculation of Tissue Emulsions or Culture.
H. 91. "H.S."—*continued.*	Original material through G.P. 2590.	10·0 mg.	Intra-venous.	81	Killed 239 days	On the mucous surface of the small intestine there were five or six greyish-green translucent spots containing a few yellowish foci. The spleen contained five grey nodules up to a hempseed in size, the larger ones containing minute yellow points. A minute greyish-white focus was seen in the liver. The lungs and kidneys were normal. Smears from the intestinal and splenic lesions showed moderately numerous T.B.; one from the liver focus showed a few T.B.	A culture obtained from the spleen grew like an avian bacillus.	Guinea-pig 3269 was inoculated intraperitoneally with an emulsion made from the lung, and Guinea-pig 3270 subcutaneously with an emulsion made from the spleen nodules. Both were killed after 74 days; one showed a single grey tubercle in the spleen (smear, T.B.), the other local tuberculosis only. Rabbit 2004 was inoculated intravenously with the spleen emulsion. It died of general tuberculosis in 94 days. Pigeons 75 and 77 were inoculated intramuscularly each with the growth from 1½ glycerin-serum tubes of culture from the spleen of Fowl 81. They were killed after 224 days and each showed a local lesion and no tuberculosis elsewhere.
H. 92. "D.N." (*Lupus.*)	Original material through G.P. 2593.	50·0 mg.	Intra-venous.	89	Killed 206 days	In the liver a small greyish-white tubercle was seen. (Smear, a few clumps of degenerated T.B.) There was no sign of tuberculosis elsewhere.	—	G.P. 3275 was inoculated intraperitoneally with an emulsion of the liver. It was killed after 72 days and showed moderately severe G.T.; a culture isolated from the omentum resembled the culture inoculated into the fowl.
		33·0 mg.	Intra-venous.	87	Killed 206 days	No sign of tuberculosis. (A smear from the spleen showed no T.B.)	—	—
H. 100. "R.S." (*Lupus.*)	Original material through G.P. 2931.	10·0 mg.	Intra-venous.	121	Killed 2 days	No sign of disease. Killed by companions.	—	—
		1·0 mg.	Intra-venous.	119	Killed 171 days	The lungs showed in the depth scattered tubercles, some pearly-grey others greyish-yellow, the largest 0·75 mm. in diameter (smear, no T.B. seen). The liver showed one minute grey focus (smear, three or four T.B. seen). There was no sign of tuberculosis elsewhere.	—	—

H. 106. "K.R." (*Lupus.*)	Original material	50·0 mg.	Intravenous.	105	Killed 129 days	No sign of tuberculosis. (A smear from the spleen showed no T.B.)	A culture isolated direct from the spleen resembled the culture inoculated.	
		10·0 mg.	Intravenous.	103	Died 45 days	Half-a-dozen small translucent tubercles with whitish centres were seen in the lungs (smear from lung, a few T.B.). The spleen was large, soft and pale (smear, T.B. in moderate numbers). No T.B. were seen in liver or kidney. Death was apparently due to some secondary infection.	A culture obtained from the spleen grew like the original.	
H. 107. "H.H." (*Lupus.*)	Original material through G.P. 2955.	10·0 mg.	Intravenous.	141	Died 32 days	Acute tuberculosis. The lungs were congested and oedematous. The liver was pale and showed a fine grey speckled appearance on surface and on section ; the liver was ruptured, and the peritoneal cavity full of blood. The spleen was slightly enlarged and contained fairly numerous minute grey foci. There was a pinhead-sized concretion in the pelvis of one kidney (smear, three T.B. seen). A smear from an emulsion of the lung contained moderately numerous T.B., and in smears from the liver and spleen also T.B. were moderately numerous ; in a smear from the kidney substance a few T.B. were seen.	—	An emulsion made from the whole of the lungs was inoculated into Fowl 149 intramuscularly, Rabbits 2081 and 2082 intravenously, and Guinea-pig 3394 subcutaneously. The fowl was killed after 191 days and showed no sign of tuberculosis ; Rabbit 2082 died in 144 days of general tuberculosis, and Rabbit 2081 was killed after 146 days and showed slight generalised tuberculosis ; the guinea-pig died in three days of an acute infection.
		10·0 mg.	Intravenous.	143	Died 30 days	No macroscopic tuberculosis ; T.B. in organs. The lungs were a little oedematous, the spleen was enlarged and pale, the liver was ruptured and the peritoneal cavity was full of blood. Smears from the lung, liver and spleen showed moderately numerous T.B.	—	—
H. 108. "H.R." (*Lupus.*)	Original material through G.P. 2957.	10·0 mg.	Intravenous.	109	Died 28 days	The body was much emaciated. The lungs were dark red and showed moderately numerous minute greyish-yellow foci (smear, T.B. numerous). The liver was large and soft and showed numerous irregular whitish-grey foci (smear, T.B.). The spleen was very soft ; translucent foci with greyish-white centres were seen on section with a hand lens (smear, T.B. moderately numerous). The kidneys were enlarged and showed minute grey points ; no T.B. were seen in two smears examined.	A culture isolated from the spleen grew like the original.	—
		1·0 mg.	Perivascular	107	Killed 126 days	There was a cord-like thickening along the vein at the site of inoculation, composed of fibrous tissue with some yellow necrotic gritty streaks. There was no tuberculosis elsewhere. (T.B. were numerous in a smear from the local lesion.)	A culture isolated from the local lesion resembled the culture inoculated.	—

FOWLS INOCULATED WITH CULTURES OF TUBERCLE BACILLI OF HUMAN ORIGIN—*continued.*

Virus.	Source of Culture.	Dose.	Method of Inoculation.	Number of Fowl.	Duration of Life.	Post-mortem Result.	Characters of Culture Isolated from Fowl.	Result of Inoculation of Tissue Emulsions or Culture.
H. 109. "M.W." (*Lupus.*)	Original material through G.P. 3002.	1·0 mg.	Intravenous	111	Died 4 days	No tuberculosis. Cause of death not determined.	—	—
		1·0 mg.	Intravenous	113	Killed 102 days	No tuberculosis. (A smear from the spleen showed no T.B.)	Culture tubes sown from the spleen remained sterile.	—
H. 68. "R.B." (*Tuberculosis of bone.*)	Original material (pus from sacral abscess).	50·0 mg.	Intravenous	16	Killed 90 days	Three minute glassy tubercles were seen in the lung, one with an opaque centre. Other organs were normal.	—	—
		10·0 mg.	Intravenous	15	Killed 90 days	A few small groups of greyish-yellow foci and some isolated grey foci were seen in the liver (smear, no T.B.). Other organs were normal. A smear from the spleen showed no T.B.	—	—
		1·0 mg.	Intravenous	14	Killed 90 days	The liver contained 3 or 4 yellow foci (smear, no T.B.). Other organs were normal.	—	—
H. 81. "P.W." (*Tuberculosis of lung.*)	Original material (lung).	50·0 mg.	Intravenous	67	Killed 183 days	No sign of tuberculosis. (Emulsion of spleen and lung, no T.B.)	—	An emulsion made of part of lung and the spleen was inoculated into Guinea-pig 3037. The guinea-pig showed slight G.T. when killed 70 days later. A culture was raised from the pyloric gland of the guinea-pig, and after 65 days cultivation was inoculated into Fowl 125 intravenously in a dose of 24·0 mg., and into Rabbit 2000 intravenously in a dose of 0·1 mg. The rabbit showed one minute tubercle in the lung only when killed after 170 days; the fowl was killed after 282 days and showed no tuberculosis.
H. 49. "T.C." (*Primary abdominal tuberculosis.*)	Human mesenteric glands (Blythwood strain).	50·0 mg.	Intravenous	37	Killed 121 days	There was a grey tubercle with an opaque centre, and a minute tubercle without central opacity, in the lungs (a smear from the former showed no T.B.). There was no tuberculosis elsewhere.	—	—
H. 118. "F.C." (*Tuberculosis of the lung.*)	Human sputum through G.P. 3343.	50·0 mg.	Intravenous	153	Died 32 days	No macroscopic tuberculosis (death from toxaemia). The lungs were congested and oedematous, but showed no tubercles. The peritoneal cavity was full of blood; the liver was ruptured and its substance was pale and	—	—

						very soft. The spleen was pale and slightly enlarged. A smear from the liver showed a moderate number of T.B.; in a smear from the spleen no T.B. were seen.		
		10·0 mg.	Intravenous	151	Killed 3 days	No sign of disease. Killed by companions.	—	...

FOWLS FED WITH A CULTURE OF TUBERCLE BACILLI OF HUMAN ORIGIN.

H. 68. "R.B." (*Tuberculosis of the sacrum.*)	Original material (pus from a sacral abscess).	50·0 mg. on each occasion.	Fed weekly for three weeks.	10	Killed 138 days	There was no sign of tuberculosis in the alimentary tract; in the liver a few yellow and grey spots were seen; one was examined and showed no tubercle bacilli. Other organs were normal.	—	—
		150·0 mg., 50·0 mg., and 50·0 mg.	Fed weekly for three weeks.	11	Killed 138 days	No tuberculosis.		

FOWLS INOCULATED WITH A CULTURE OF TUBERCLE BACILLI OF HUMAN ORIGIN, KILLED BY HEATING TO A TEMPERATURE OF 100·0° C.

Virus.	Source of Culture.	Dose.	Method of Inoculation.	Number of Fowl.	Duration of Life.	Result.
H. 115. "N.G." (*Tuberculous meningitis.*)	Human cerebro-spinal fluid through G.P. 3086.	100·0 mg. of a 50 days old broth culture killed by heating.	Intravenous	133	Killed 40 days	The lungs were firmer than normal, and showed extensive areas of consolidation, the solid lung tissue being grey and airless; in the crepitant portions there was distinct thickening of the margins of the alveoli; no definite tubercles were seen. The liver was paler than normal and showed scattered irregular yellow foci. The spleen was enlarged but showed no definite foci. The kidneys appeared normal.
		100·0 mg. of a 50 days old broth culture killed by heating.	Intravenous	137	Died 45 days	The lungs showed no areas of consolidation and no tubercles. The liver showed scattered ill-defined pale spots. The spleen was very small and the body emaciated. The cause of death was not apparent. A smear from the lung showed a moderate number of T.B.; in a smear from the spleen four T.B. were seen.
		100·0 mg. of a 50 days old broth culture killed by heating.	Intravenous and partly perivenous.	135	Killed 263 days	No sign of tuberculosis.

TABULAR SUMMARIES OF FEEDING EXPERIMENTS (OF LONG DURATION). (*See* pages 48–50.)

FEEDING EXPERIMENTS (OF LONG DURATION)
WITH CULTURES OF SLIGHTLY VIRULENT TUBERCLE BACILLI OF HUMAN ORIGIN.

PIGS.

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Number of Pig.	Weight in Kilos.		Duration of Life.	Result.
					Initial.	Final.		
H. 68. "R.B." (*Tuberculosis of the sacrum.*)	Pus from a sacral abscess.	From 190 to 324 days.	Fed weekly during a period of 19 weeks. Total quantity received : 1500·0 mg.	**75**	9·52	62·58	Killed 176 days	The submaxillary and one right cervical glands contained caseo-calcareous nodules, the largest 1 cm. in diameter. The glands in the posterior parts of the mesentery showed numerous similar nodules ; in the anterior glands they were small and sparsely distributed. One ileo-colic gland contained six nodules. In the lungs there were sparsely scattered (about 30 in all) grey nodules with caseo-calcareous centres, the majority 1·5 mm. in diameter. One portal and two colic glands contained each a single tubercle. T.B. were scanty in a smear from a submaxillary gland, none was seen in a smear from a colic gland tubercle. Guinea-pigs inoculated with emulsions of muscle, liver, and lung became tuberculous ; one inoculated with emulsion of spleen remained healthy.
		„	Fed weekly during a period of 19 weeks. Total quantity received : 1500·0 mg.	**77**	11·34	109·75	Killed 377 days	Two or three small highly calcareous bodies were found in each tonsil. The submaxillary glands contained scattered calcareous tubercles up to a pinhead in size, here and there grouped together. Many of the mesenteric glands contained discrete calcareous tubercles up to 1 mm. in diameter. In the lungs ten calcareous tubercles were found, the largest about 1 mm. in diameter. No T.B. were seen in a focus from the tonsil, in an emulsion of submaxillary glands or in a tubercle from the lung. Guinea-pigs inoculated with emulsions of the lung and submaxillary gland became tuberculous, one inoculated with emulsion of spleen remained healthy.
		190 days	Fed once only : 50·0 mg.	**79**	10·90	55·79	Killed 178 days	The submaxillary glands contained each about half a dozen caseo-calcareous nodules (5 to 10 mm.), the right pharyngeal one, the mesenteric glands ten. Two ileo-colic, one colic, and two portal glands contained one or two tubercles each. The lungs showed very sparsely scattered small grey tubercles, the larger with caseo-calcareous centres. Three T.B. were seen in a smear from a mesenteric gland, none in one from a portal gland.
		„	Fed once only : 50·0 mg.	**81**	10·43	127·91	Killed 378 days	The submaxillary glands were enlarged and extensively replaced by cheesy, gritty caseous nodules with thin fibrous capsules, up to 1·5 cm. in diameter ; two cervical glands contained each a similar nodule. The majority of the mesenteric glands contained from one to six nodules up to a hempseed in size, the smaller calcareous, the larger caseous and softened. The colic, thoracic, and portal glands contained an occasional tubercle. Two calcareous tubercles were seen in the lung and a fibro-calcareous tubercle in the liver. (No T.B. seen.) T.B. were scanty in an emulsion of the submaxillary glands ; two guinea-pigs inoculated with the emulsion became tuberculous.
H. 70. "N.W." (*Primary abdominal tuberculosis.*)	Human lung	301 days	50·0 mg.	**101**	21·77	76·65	Killed 154 days	The submaxillary, left parotideal, and retropharyngeal glands contained calcareo-caseous nodules up to 4 mm. in diameter. Similar nodules were sparsely distributed in the mesenteric and ileo-colic glands. There was no tuberculosis elsewhere. In an emulsion of nodules from a mesenteric gland no T.B. were seen, and three egg tubes sown with the emulsion remained sterile.

GOATS.

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Number of Goat.	Weight in Kilos.		Duration of Life.	Result.
					Initial.	Final.		
H. 68. "R.B." ... (*Tuberculosis of the sacrum.*)	Pus from sacral abscess.	204 days	50·0 mg.	53	25·00	29·93	Killed 93 days	Local tuberculosis. The pharyngeal and submaxillary glands contained numerous caseo-calcareous nodules and tubercles. A few similar tubercles were found in the parotideal, three cervical, and four gastric glands; four calcareous tubercles were seen in the mesenteric glands, and irregular caseo-calcareous nodules in two ileo-colic glands. There was no tuberculosis elsewhere.
H. 76. "G.M." .. (*Tuberculosis of knee-joint.*)	Human synovial membrane through G.P. 2887.	224 days	74·0 mg	75	32·65	39·91	Killed 328 days	Local tuberculosis. One submaxillary one pharyngeal and one parotideal gland contained each a few calcareous tubercles; one mesenteric gland contained a calcareous patch and calcareous tubercles, another a single tubercle. Three ileo-colic glands contained calcareo-caseous patches, and three other ileo-colic and one portal gland contained each one or two caseous or calcareo-caseous nodules. There was no tuberculosis elsewhere.

HORSE.

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Number of Horse.	Age.	Duration of Life.	Result.
H. 81. "P.W." ... (*Tuberculosis of lung.*)	Human lung	227 days	Between 100·0 and 150·0 mg.	3	Probably 18 or more years.	Killed 130 days	There was no sign of tuberculosis in any of the organs or glands of the body, and guinea-pigs inoculated with emulsions of spleen, liver, submaxillary gland and bronchial gland did not become tuberculous.

FEEDING EXPERIMENTS.

WITH CULTURES OF SLIGHTLY VIRULENT TUBERCLE BACILLI OF HUMAN ORIGIN—*continued.*

DOGS.

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Number of Dog.	Duration of Life.	Result.
H. 70. "N.W." ... *(Primary abdominal tuberculosis.)*	Human lung	301 days	50·0 mg.	37 (Young adult).	Killed 99 days	There were three or four small yellow foci in the retro-pharyngeal glands (a smear from one showed 3 T.B., a smear from another showed no T.B.); two were seen also in one mesenteric gland (no T.B. in smears from either). Three minute grey foci were seen in the liver. There was no sign of tuberculosis elsewhere.
H. 81. "P.W." ... *(Tuberculosis of the lung.)*	Human lung	72 days	50·0 mg.	35 (Young adult).	Killed 102 days	No tuberculosis.

CATS.

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milligrammes.	Number of Cat.	Age and Weight.	Duration of Life.	Result
H. 70. "N.W." ... *(Primary abdominal tuberculosis.)*	Human lung	301 days	50·0 mg.	41	Adult. 3,250 gr.	Killed 108 days	No tuberculosis.
H. 75. "A.H." ... *(Primary abdominal tuberculosis.)*	Human peritoneal fluid through G.P. 2018.	99 days	10·0 mg.	35	Adult. 1,550 gr.	Killed 98 days	No tuberculosis.
H. 81. "P.W." ... *(Tuberculosis of the lung.)*	Human lung	72 days	50·0 mg.	39	Adult. 1,650 gr.	Killed 110 days	No tuberculosis.
H. 126. "A.W." ... *(Tuberculosis of the lung.)*	Human sputum through G.P. 3456.	172 days	They received between them 50·0 mg. on 13th, 50·0 mg. on 14th, and 14·0 mg. on 15th September 1909.	73	Kitten. 1,050 gr.	Killed 99 days	No tuberculosis.
				75	Kitten. 1,070 gr.	Killed 99 days	No tuberculosis.
				77	Kitten. 1,000 gr.	Killed 99 days	No tuberculosis.

RHESUS MONKEYS.

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Number of Monkey.	Duration of Life.	Result.
H. 60. "W.B." ... (*General miliary tuberculosis of uncertain origin.*)	Human mesenteric gland through G.P. 1829.	41 days	1·0 mg.	81	Died 50 days	General tuberculosis. The pharyngeal and cervical glands were enlarged caseous and softened; the intestines and mesenteric glands were normal. Both lungs contained a few small tubercles, and the right showed also some very large caseous masses. The bronchial glands were very large caseous and softened. The thyroid was packed with tubercles. There were many caseous tubercles in the spleen, a moderate number in the liver, and very few in the kidneys.
			1·0 mg.	83	Died 56 days	General tuberculosis. One pharyngeal gland contained a caseous focus; there was one small tubercle in the large intestine and a small caseous focus in the corresponding meso-colic gland. The lungs were adherent to the pleura and there were caseous tubercles along the lines of the ribs. The left upper lobe of the lungs was a mass of soft caseous tissue, the left lower lobe contained a large caseous and softened nodule and a few small tubercles; the upper and lower lobes on the right side showed an occasional small tubercle, the middle lobe was entirely caseous. The bronchial glands were greatly enlarged and some were entirely softened. The spleen was enlarged and contained a large number of caseous softening nodules. The liver showed a considerable number of caseous tubercles and a few caseous and softening nodules. There was a caseous tubercle in one kidney, and several small tubercles in the suprarenal bodies. The portal coeliac and left inguinal glands contained an occasional small caseous focus.
			0·1 mg.	79	Died 84 days	General tuberculosis. The pharyngeal and one mesenteric gland contained caseous foci, and a second mesenteric gland was caseous throughout. Two small tubercles were seen in the duodenum, and two small caseous ulcers in the large intestine. The upper lobe of the right lung was solid and caseous, the lower lobe was dark in colour and almost airless; the whole lung was adherent to the costal pleura which was thickened and caseous. The left lung contained only a few scattered tubercles. The diaphragm on the right side was caseous throughout its entire thickness. The bronchial glands were probably incorporated with the caseous mass already mentioned. The omentum contained numerous minute tubercles. The spleen was enlarged and closely studded with pea sized caseous softened nodules; the liver contained innumerable minute yellow tubercles, and there were a few small caseous tubercles in each kidney. Three tubercles were seen in the pancreas.

FEEDING EXPERIMENTS.

WITH CULTURES OF SLIGHTLY VIRULENT TUBERCLE BACILLI OF HUMAN ORIGIN—*continued.*

RABBITS.

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Number of Rabbit.	Weight in Grammes.		Duration of Life.	Result.
					Initial.	Final.		
H. 68. "R.B." ... (*Tuberculosis of the sacrum.*)	Pus from a sacral abscess.	218 days	10·0 mg.	**1031**	1,350	3,700	Killed 181 days	No tuberculosis.
			10·0 mg.	**1032**	1,120	950	Died 21 days	The alimentary tract was normal. In the lungs there were two caseous nodules (smear, no T.B.). Other organs and glands showed no sign of tuberculosis.
H. 70. "N.W." (*Primary abdominal tuberculosis.*)	Human cervical gland through G.P. 1933.	62 days	10·0 mg.	**1003**	1,900	2,700	Killed 188 days	In the lungs there was a firm reddish nodule showing caseous infiltration (smear, T.B.). There was no sign of tuberculosis elsewhere.
H. 72. "H.C." .. (*Tuberculosis of a rib.*)	Pus from a rib abscess through G.P. 1945.	82 days	10·0 mg.	**1010**	1,950	3,300	Killed 183 days	The right submaxillary gland contained three or four calcareous grains. There was no sign of tuberculosis elsewhere.

GUINEA-PIGS.

Virus.	Immediate Source of Culture.	Total Duration of Artificial Cultivation.	Dose in Milli-grammes.	Number of Guinea-pig.	Weight in Grammes.		Duration of Life.	Result.
					Initial.	Final.		
H. 68. "R.B." ... (*Tuberculosis of the sacrum.*)	Pus from a sacral abscess.	218 days	10·0 mg.	**2097**	400	380	Died 97 days	General tuberculosis. The glands of the neck were slightly enlarged and congested, and two contained each a greyish miliary tubercle. The mesenteric and ileo-colic glands were slightly enlarged and partly caseous or calcareous. Two Peyer's patches were thickened, indurated and irregularly caseated, but not ulcerated; another contained a caseous tubercle. A lymphoid patch in the caecum contained a caseous focus. The lungs were adherent in many places to the chest wall and were very closely beset with caseous tubercles varying in size up to a pea, in many places confluent forming caseous patches. The spleen was enlarged, caseo-necrotic around the margins and with discrete tubercles elsewhere; the liver showed many large necrotic patches. One kidney contained a small tubercle. The bronchial and manubrial glands were indurated and irregularly caseated; the portal coeliac and lumbar glands showed small caseous or calcareous patches, and one inguinal and one axillary gland were caseous; all these glands were slightly enlarged.

			10·0 mg.	2098	440	420	Died 151 days	Chronic general tuberculosis. The glands in the neck and the mesenteric glands were slightly enlarged and indurated; the intestines were normal. The lungs were enlarged and closely beset with grey nodules, in places confluent. The bronchial glands were slightly enlarged and showed a few opaque points. The spleen was much enlarged and closely beset with grey translucent tubercles, and the liver contained numerous small necrotic patches.
			10·0 mg.	2099	520	570	Killed 190 days (when ill).	Chronic general tuberculosis. The glands in the neck were enlarged and fibro-caseous. One mesenteric and one ileo-colic gland were enlarged, indurated, and showed scattered yellow foci, some gritty. The small intestine was normal; the wall of the first part of the colon was studded with flat caseous nodules up to 5 mm. (smear, 1 T.B. seen); they projected slightly on the serous surface, and some showed healed ulcers on the mucous surface; along the attachment of the mesentery they were confluent and formed a continuous layer. The lungs contained numerous nodules and several irregular masses composed of confluent nodules; some of the nodules were grey, with only a trace of caseation; others were almost completely caseous and with cavities in their centres. The spleen was enlarged and its substance extensively replaced by firm caseo-necrotic masses. The liver was beset with grey foci, and showed also a few patches of necrosis. The bronchial, ventral mediastinal, portal, pyloric and coeliac glands were similar to the glands of the neck.
			10·0 mg.	2100	650	660	Died 122 days	Chronic general tuberculosis. All the glands in the neck were enlarged, very indurated and showed slight caseation. Two lymphoid patches in the caecum were slightly thickened and showed one or two opaque points. The mesenteric glands were much enlarged, the ileo-colic slightly; all were composed of a dense fibroid tissue in which only one caseous focus was found. The bronchial and portal glands were similar. The thorax was filled with red fluid; the lungs were closely beset with translucent nodules in places confluent showing very little evidence of caseation, a few nodules caseous almost throughout were also seen. The spleen was almost three times the normal in size and was closely beset with irregular translucent tubercles; the liver contained fairly numerous grey tubercles and one or two yellow patches of necrosis.
H. 70. "N.W." (*Primary abdominal tuberculosis.*)	Human lung	141 days	10·0 mg.	1978	370	350	Died 121 days	Chronic general tuberculosis. All the glands in the neck were enlarged and showed varying degrees of caseation and softening. The mesenteric and ileo-colic glands were enlarged, indurated, extensively caseated and slightly calcareous. One Peyer's patch in the small intestine was indurated and contained a minute yellow spot. The lungs were severely affected: the anterior lobes were composed mainly of reddish-grey tissue containing caseous nodules, some with cavities; the caudal lobes were closely beset with greyish translucent nodules, many with cavities and some with minute caseous centres, and the posterior tips were occupied by caseous nodules. The bronchial glands were fibro-caseo-calcareous and partly softened. The omentum contained a few minute tubercles. The spleen was very large and composed mainly of caseo-necrotic tissue; the liver was enlarged and showed numerous large caseo-necrotic patches. The portal and coeliac glands contained small caseo-calcareous nodules; the lumbar and iliac and the peripheral glands were enlarged and caseating.

FEEDING EXPERIMENTS

WITH CULTURES OF SLIGHTLY VIRULENT TUBERCLE BACILLI OF HUMAN ORIGIN—*continued.*

GUINEA-PIGS—*continued.*

Virus.	Immediate Source of Culture.	Total duration of Artificial Cultivation.	Dose in Milli-grammes.	Number of Guinea-pig.	Weight in grammes.		Duration of Life.	Result.
					Initial.	Final.		
H. 70. "N.W."—*continued.*	Human lung.	141 days.	10·0 mg.	**1979**	220	250	Died 91 days	Chronic general tuberculosis. The submaxillary, cervical and mesenteric glands were enlarged and showed varying degrees of caseation; the submental glands were enlarged, caseous and softened throughout. The intestines were normal. The lungs contained fairly numerous small pale grey tubercles. The spleen was very large and partly composed of yellowish necrotic patches; the liver substance was also extensively replaced by patches of necrosis. The bronchial and portal glands were slightly enlarged, fibroid and contained a few caseous foci; the right axillary was enlarged and caseous throughout; other lymphatic glands were slightly caseous.
			1·0 mg.	**1980**	350	450	Died 160 days	Chronic general tuberculosis. All the glands in the neck were moderately enlarged, indurated and contained small caseous patches and foci. The mesenteric glands were much enlarged, very fibroid and contained small dense caseous patches; the ileo-colic and colic glands were enlarged and indurated. One Peyer's patch in the small intestine was fibroid and had an ulcerated surface without caseation. The pleural cavities were filled with fluid and the parietal pleura showed a number of flattened tubercles some caseous; the lungs were extensively occupied by large fibroid patches showing here and there caseous foci, and discrete nodules some caseous a few with central cavities. The bronchial glands were dense and fibroid with small soft caseous patches; the sternal and manubrial glands were fibroid. The spleen was very large and mainly composed of caseo-necrotic substance. The liver was enlarged and showed large patches of necrosis. Each kidney showed one or two minute grey tubercles. The portal gland was very dense and showed one or two caseous points; the coeliac and lumbar glands were very indurated.
			1·0 mg.	**1981**	330	570	Died 206 days	Chronic general tuberculosis. Under the chin there was a thin-walled abscess (1 cm.) filled with caseo-pus. The submaxillary and cervical glands were slightly enlarged and contained soft caseous nodules, not numerous; one mesenteric gland contained a yellow focus; the intestines were normal. There was an excess of fluid in the pericardial sac and the pleural cavities. The lungs were large; the anterior lobes were almost entirely composed of reddish-grey tissue containing caseous nodules; the caudal lobes were closely beset with caseous nodules some with central cavities. The spleen was very large and contained necrotic patches and caseous tubercles. The liver was much enlarged, pale and infiltrated with caseo-necrotic areas. The bronchial glands were very indurated and showed yellow points; the portal, coeliac, lumbar and iliac glands contained yellow tubercles.

			0·1 mg.	**1982**	370	630	Died 169 days	Chronic general tuberculosis. All the glands in the neck were enlarged, very dense and fibroid with foci of necrosis. The mesenteric glands and intestines were normal. The lungs contained fairly numerous dense grey nodules of various sizes. In the liver there were a few grey tubercles and dense fibroid patches containing soft foci. The spleen was enlarged and contained numerous grey tubercles, and several large firm patches not definitely necrosed. The bronchial, sternal, lumbar and iliac glands were enlarged very dense and contained discrete yellow foci ; the portal gland was dense and fibroid.
			0·1 mg.	**1983**	370	330	Died 72 days	General tuberculosis. The submental and cervical glands were enlarged, indurated and contained firm caseous patches. The intestines and mesenteric glands were normal. The lungs contained a few pale grey tubercles and a nodule with a caseous centre. The spleen was enlarged and contained numerous irregular grey tubercles and three or four small caseo-necrotic patches ; the liver was mottled with aggregations of grey tubercles and showed also one or two yellow foci. The bronchial, portal, lumbar, and the peripheral glands were similar to the submental.

CHARTS OF THE INOCULATION EXPERIMENTS WITH EACH VIRUS AND FULL POST-MORTEM NOTES OF THE LARGER ANIMALS.

VIRUS H. 60. "W.B."

GENERAL MILIARY TUBERCULOSIS OF UNCERTAIN ORIGIN.

VIRUS H. 60. "W.B."

JANUARY 12, 1906.

CULTURE INOCULATIONS.

BRONCHIAL GLANDS.

(*a*) JUNE 15, 1906.

The strain was derived from the human bronchial glands through Guinea-pig 1825, and had been in cultivation a total period of 72 days.

The culture used was the 3rd generation, 21 days old.

CALF 1099.
Subcutaneous.
Dose : 50·0 mg.
Killed when dying : July 13, 1906.
28 days.
P.M.—General tuberculosis, severe.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
907	Intrap.	10·0 mg.	K.D. 28 days	G.T.
908	Intrap.	1·0 mg.	D. 33 „	G.T.
909	Intrap.	0·1 mg.	D. 83 „	Chronic progressive T. Injection probably subcut. to a slight extent.

(*b*) AUGUST 3, 1906.

Total duration of artificial cultivation : 121 days.

The culture used was the 4th generation, 23 days old.

CALF 1107.
Subcutaneous.
Dose : 10·0 mg.
Died : Sept. 30, 1906.
58 days.
P.M.—General tuberculosis, severe.

CALF 1109.
Subcutaneous.
Dose : 10·0 mg.
Died : Sept. 4, 1906.
32 days.
P.M.—General tuberculosis, severe.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
933	Intrap.	1·0 mg.	D. 36 days	G.T.
934	Intrap.	0·1 mg.	K. (ill) 118 days	Chronic G.T.
935	Intrap.	0·1 mg.	D. 82 days	G.T.
936	Intrap.	0·01 mg.	D. 96 „	G.T.

MESENTERIC GLANDS.

MAY 1, 1906.

(*a.*)

The strain was derived from the human mesenteric glands through Guinea-pig 1829, and had been in cultivation a total period of 41 days.

The culture used was the 2nd generation, 21 days old, on serum.

CALF 1049.
Subcutaneous.
Dose : 50·0 mg.
Killed : Aug. 3, 1906.
94 days.

P.M.—Small fibro-calcareous local lesion; calcareous grains in prescapular gland. No tuberculosis elsewhere.

MONKEY 79.
Fed.
Dose : 0·1 mg.
Died : July 24, 1906.
84 days.

P.M. —General tuberculosis. [The lungs and thoracic glands were very severely affected, the alimentary tract only slightly.]

MONKEY 81.
Fed.
Dose : 1·0 mg.
Died : June 20, 1906.
50 days.

P.M. —General tuberculosis. [The glands of the neck and throat were caseous, the intestines and mesenteric glands normal.]

MONKEY 83.
Fed.
Dose : 1·0 mg.
Died : June 26, 1906.
56 days.

P.M. —General tuberculosis. [Very severe in lungs; alimentary tract very slightly affected.]

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
864	Intrap.	10·0 mg.	K. 98 days	Slight chronic T. of peritoneum and one kidney.
865	Intrap.	1·0 mg.	K. 98 ,,	Slight tuberculous peritonitis. Trace in one lung and one kidney.
866	Intrap.	1·0 mg.	K. 98 ,,	Slight tuberculous peritonitis. Trace in one kidney.

(*b.*)

The strain was derived from the human mesenteric glands through Guinea-pig 1830, and had been in cultivation a total period of 32 days.
The culture used was the 2nd generation, 21 days old, on glycerin-serum.

CALF 1053.
Subcutaneous.
Dose : 650·0 mg.
Killed : Aug. 4, 1906.
95 days.

P.M.—Large pendulous cyst containing curdy fluid at seat of inoculation. Fibro-calcareous nodules in prescapular gland. Several minute tubercles in lungs, and one larger one. Small tubercles in several lymphatic glands.

VIRUS H. 60. "W.B."

CULTURE INOCULATIONS—*continued.*

MENINGES.

MARCH 28, 1906.

The strain was derived from the human meninges through Guinea-pig 1832, and had been in cultivation a total period of 36 days.

The cultures used were of the 2nd and 3rd generations, 20 days old.

CALF 989.

Subcutaneous.

Dose: 50·0 mg.

Killed when well, having been ill: June 27, 1906.

91 days.

P.M.—Fibro-calcareous and partly softened local tumour. Prescapular gland fibro-calcareous. The lungs contained three minute foci and a fibro-calcareous nodule.

CALF 995.

Subcutaneous.

Dose: 50·0 mg.

Killed: June 28, 1906.

92 days.

P.M.—Small local tumour. Two fibro-calcareous nodules in prescapular gland. Few calcareous specks in thoracic and three mesenteric glands.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
826	Intrap.	10·0 mg.	K. 92 days	Trace of T. in peritoneum. Abscesses in caecal wall (injection partly intra-caecal).
827	Intrap.	1·0 mg.	K. 92 ,,	Slight tuberculous peritonitis. Trace in kidneys.

LUNG.

MAY 22, 1906.

The strain was derived from the human lung through Guinea-pig 1827, and had been in artificial cultivation a total period of 60 days.

The culture used was the 2nd generation, 21 days old.

CALF 1081.

Subcutaneous.

Dose: 50·0 mg.

Killed: Aug. 20, 1906.

90 days.

P.M.—Local abscess, containing softened caseous matter. The prescapular gland was calcareous. There were a few irregular grey tubercles with yellow centres, and one larger fibro-calcareous nodule, in the lungs. One or two tubercles were seen in the spleen and ten in the liver; a few glands contained each a minute tubercle.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
886	Intrap.	10·0 mg.	D. 45 days	Slight T. of peritoneum. Cause of death undetermined.
887	Intrap.	1·0 mg.	K. 107 ,,	Many cysticerci in omentum and peritoneum had caseous contents. No T. elsewhere.

CALF 1099. Virus H. 60. "W.B."

Subcutaneous inoculation of culture derived from the human bronchial glands through Guinea-pig 1825.

Dose—50·0 milligrammes.

Date of Inoculation—June 15, 1906. [Age about 9 weeks.]

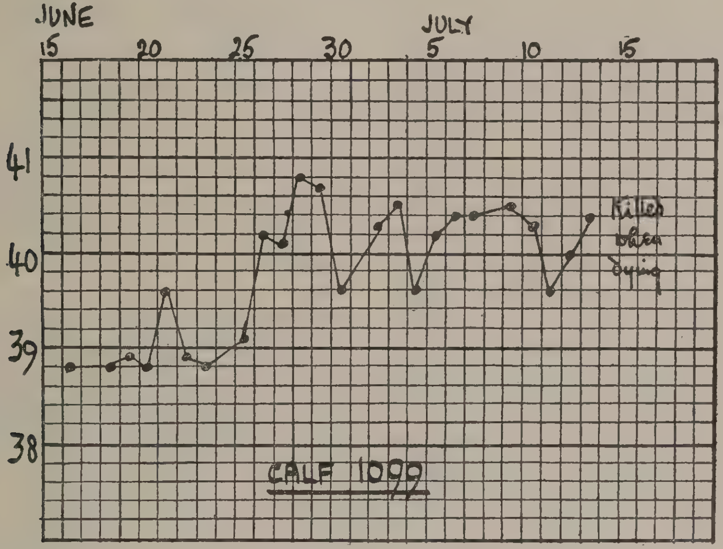
Killed when dying—July 13, 1906. [28 days after inoculation.]

Clinical Notes.

A large tumour developed at the seat of inoculation; the calf became ill, and wasted rapidly. By the second week in July it was greatly emaciated, it hung its head, the respiration was increased in frequency, and the animal was obviously going to die.

On July 13 it was found lying on its side with neck stretched out and head retracted; it was thought improbable that the animal would live another day and it was therefore killed.

Temperature.



Tuberculin Test.—The calf was not tested subsequent to inoculation.

Weights.

	qrs.	lbs.
June 15, 1906	3	22
July 13, 1906	3	5

Total loss of weight—17 lbs.

Average rate of loss per week.—4·25 lbs.

POST-MORTEM EXAMINATION.

The carcass was greatly emaciated.

Local Lesion.—At the seat of injection, on the right side of the neck, there was a flat solid tumour which measured 15·8 by 11·4 by 3·8 cm., and weighed 1 lb.

It was composed of dense fibro-necrotic tissue, and infiltrated the skin and subjacent muscle.

Right Prescapular Gland.—The right prescapular gland was enlarged. It measured 8·2 by 4·5 by 3·2 cm., and weighed 3 ozs.

It was chiefly composed of salmon-pink necrotic tissue, the rest consisting of an opaque yellowish network with a dense translucent grey tissue in its meshes.

Right Prepectoral Gland.—The right prepectoral gland was as large as a cherry and similar in structure to the prescapular.

Right Cervical Glands.—There were one or two deep cervical glands similar to the above but less advanced.

The Left Prescapular and Axillary Glands contained rather large grey tubercles.

Thorax.

Pleura.—Normal.

Lungs.—The lungs weighed 4 lbs. 2 ozs. The anterior parts were dark and consolidated, and very finely and closely studded with little early grey tubercles. Section showed the lung everywhere very thickly peppered with these little tubercles, so thickly that they were largely confluent, thus causing portions of the lung to be almost solid. The anterior parts were solid, owing to the confluence of the red zones around the tubercles.

Trachea.—Normal.

Thoracic Glands.—The thoracic glands were enlarged and firm, and their cortex uniformly changed, containing the beginnings of an opaque yellowish network.

Heart.—The heart contained many minute grey tubercles in the endocardium of the right auricle, and one in that of the right ventricle.

Abdomen.

Omentum.—The omentum was sparsely studded with little tubercles.

Intestines.—The intestines appeared to be normal.

Mesenteric Glands.—Every gland contained one or more rather large grey tubercles.

Spleen. — The spleen was packed with reddish tubercles with small opaque yellowish white centres. The latter were most easily seen when the tubercles were crushed.

Liver.—The liver was very thickly peppered with minute grey tubercles, and innumerable little tubercles were seen on section.

Portal Glands.—The portal glands resembled the thoracic.

Kidneys.—The kidneys contained large numbers of minute tubercles.

Suprarenal Bodies.—Both suprarenal bodies contained little tubercles.

Renal Glands, Lumbar Glands, Iliac Glands.—These glands contained rather large grey tubercles.

Genito-Urinary System.

Testes.—A small tubercle was found in the right: the left was normal.

Special Glands.

Precrural, Pubic, Gluteal, Ischiatic, Popliteal, Submaxillary, Subparotid, Retro-pharyngeal, Hyoid.—All contained rather large grey tubercles.

Tongue.—Normal.

Tonsils.—There were some doubtful little points in the tonsils.

Pharynx.—One little tubercle was seen in the mucous membrane of the pharynx.

Larynx.—Normal.

CALF 1107. Virus H. 60. "W.B."

Subcutaneous inoculation of culture derived from the human bronchial gland through Guinea-pig 1825.

Date of Inoculation—August 3, 1906. [Age about 10 weeks.]

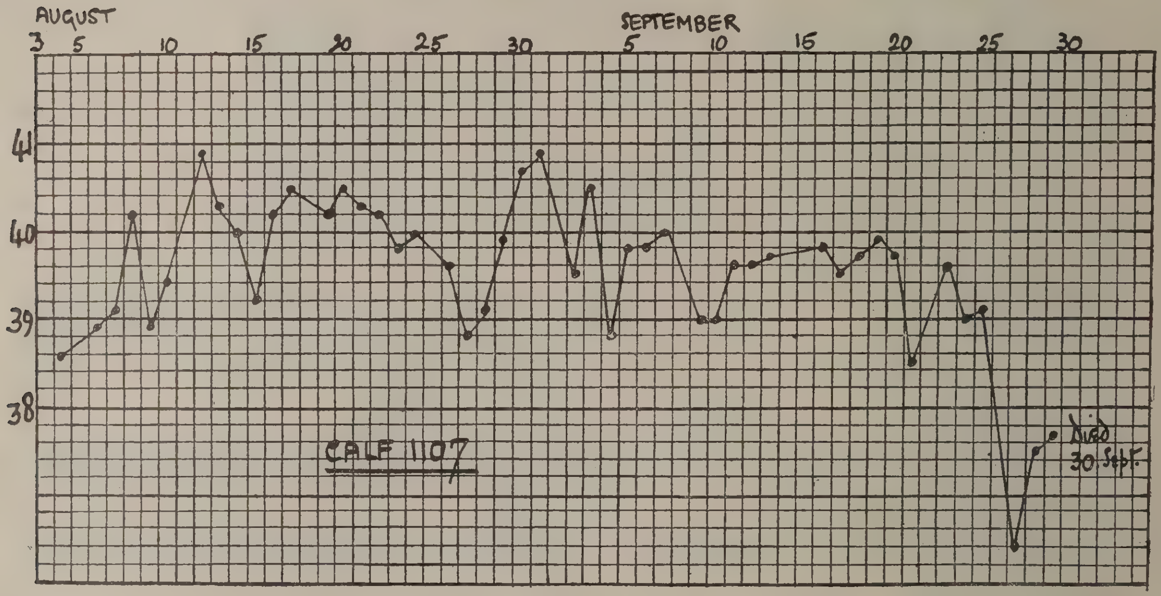
Dose—10·0 milligrammes.

Died—September 30, 1906. [58 days after inoculation.]

Clinical Notes.

The course of the disease was similar to that frequently seen after the injection of 10·0 mg. of a virulent virus.

Temperature.



Tuberculin Test.—The calf was not tested subsequent to inoculation.

Weights.

	qrs.	lbs.
August 3, 1906	3	21
September 30, 1906	3	11

Total loss of weight.—10 lbs.

Average rate of loss per week.—1·2 lbs.

POST-MORTEM EXAMINATION.

General Condition.—Thin.

Local Lesion.—At the seat of inoculation on the right side of the neck, just in front of the shoulder, there was a firm tumour measuring 21·5 by 11·5 by about 6·3 cm. in its greatest thickness. It weighed, with attached skin, 1 lb. 15 ozs. The lower part was thinner than the upper and curved round the shoulder into the dewlap. The epidermal layer of the skin over the thicker part was fissured and necrosed, and could be readily peeled away.

On section the subcutaneous part of the tumour was composed of a layer, 1·8 cm. in its greatest thickness, of homogeneous yellowish caseo-necrotic tissue containing a few small spaces filled with serous fluid. To this layer the skin was intimately adherent, and over the thick part of the tumour was completely destroyed by caseation and necrosis. The deeper portions consisted of yellow caseous slightly gritty nodules embedded in a scanty matrix of fibroid muscular tissue.

The tumour was connected with the prescapular and the spherical prepectoral glands by thickening caseous lymphatic cords.

Right Prescapular Gland.—The right prescapular gland measured 9·5 by 5 by 5 cm. and weighed 6 ozs. On section it was composed throughout of dense yellow caseo-necrotic substance containing sparsely scattered calcareous foci. The capsule was much thickened; attached to it at the inferior extremity there was a gland 1·8 cm. in diameter which showed a similar structure on section.

Prepectoral Glands.—The rounded prepectoral gland measured about 2 cm. in diameter and resembled the prescapular. The reniform gland, 3·2 cm. in length, was firmer than normal and showed the cortex closely beset with small irregular caseous patches and foci.

Cervical Glands.—The lower cervical glands on the right side, each the size of a broad bean, resembled the reniform prepectoral. The other gland on this side and all those on the right side contained discrete nodules similar to those in the peripheral glands.

The Left Prescapular and Axillary Glands contained numerous discrete caseous nodules. The former contained in addition two caseous masses, the larger 1·8 cm. in its greatest diameter.

Thorax.

Pleura.—The pleura on the right side showed a few flattened caseous nodules, occurring chiefly in clusters; the lymphatic fringes here and there were congested and slightly hypertrophied. On the pleural surface of the diaphragm there were three or four loosely attached lenticular fibro-caseous nodules, the largest 7 mm. in diameter.

Lungs.—The lungs were heavy and weighed 4 lbs. 7 ozs. All the lobes were in an advanced condition of pneumonic consolidation (red hepatization); in the cephalic, right middle and ventral portions of the caudal lobes very little crepitant lung tissue remained; towards the dorsal and posterior parts of the caudal lobes the consolidation became less extensive and more diffuse.

The surfaces of the lung were closely studded with raised greyish yellow nodules which projected most prominently from the anterior lobes. The nodules were greyish yellow and homogeneous, except that many contained a central calcareous focus, and ranged in size from a millet-seed to a pea. On section the lung substance was found to be closely beset with similar nodules, most numerous apparently in the more solid parts. In various places they were aggregated together, but did not form any large tuberculous masses.

Thoracic Glands.—The bronchial and mediastinal glands were much enlarged and weighed together 10½ ozs. The caudal mediastinal gland measured 17·7 cm. in length. On section the cortices were composed of dense caseated tissue uniformly yellowish white except for some grey translucent islets and streaks. Calcareous foci were sparsely scattered throughout. The medullary portions were congested.

Heart.—On the endocardium of the right auricle, and on the internal surface of the commencement of the vena cava, there were fairly numerous minute greyish granules just perceptible to the touch. The heart was elsewhere normal.

Abdomen.

Peritoneum and Omentum.—On the peritoneal surface of the diaphragm, on the right side, were numerous slightly raised firm flattened caseating nodules, the largest about 7 mm. in greatest diameter. On the ventral surface of the omentum there were about 20 nodules ranging in size from a millet seed to a pea. These on section were dense and fibro-caseous, and each contained a central calcareous focus.

Small Intestines.—The Peyer's patches throughout the whole length of the small intestines contained yellow caseous nodules, the largest about the size of a hemp-seed; they were most numerous in the long Peyer's patch.

The Large Intestine.—Under the mucous membrane of the caecum and upper part of colon there were fairly numerous firm caseous nodules up to a hemp-seed in size.

Mesenteric Glands.—The mesenteric glands were slightly enlarged and were extensively tuberculous. Those at the extremities of the mesentery showed the cortices almost entirely replaced by confluent caseating masses containing sparsely scattered calcareous foci. The glands in the central portions contained more or less discrete nodules which varied considerably in size.

Ileo-colic Glands.—The ileo-colic glands resembled those at the extremities of the mesentery.

Colic and Gastric Glands.—These glands were slightly enlarged and closely beset with caseating nodules.

Spleen.—The spleen was enlarged and weighed 11 ozs. Numerous nodules could be seen through the capsule, and these formed slight projections from the surface. On section the pulp was closely packed with firm greyish-yellow somewhat translucent nodules, the largest about 5 mm. in diameter. Each of the nodules showed in the centre an opaque yellow calcareous focus.

Liver.—The liver showed on the surface numerous caseous nodules ranging from a millet-seed to a hemp-seed. Most of these were completely embedded in the substance, or caused at most slight projections from the surface. A few however were more superficial and were flattened out to a larger diameter (up to 5 mm.) and had grey overhanging margins. On section there were numerous nodules evenly distributed throughout the liver substance.

Gall Bladder.—Normal.

Portal Glands.—The portal glands were much enlarged and nodular on the surface; on section the cortices were practically entirely replaced by a dense almost uniformly caseated tissue containing scattered calcareous foci. (They closely resembled the thoracic glands.)

Kidneys.—Each kidney showed on the surface about a dozen yellow caseous nodules with narrow grey margins, the largest the size of a hemp-seed. A few similar tubercles were seen on section.

Suprarenal Bodies.—The left showed in the cortex three minute greyish white tubercles. The right was normal.

Renal Gland.—The renal gland was enlarged, and its substance very closely beset with caseous nodules.

Coeliac Glands.—The coeliac glands were enlarged and resembled the portal, but were not quite so advanced in caseation.

Lumbar Glands.—Some of the lumbar glands resembled the coeliac, others contained discrete nodules.

Pharynx.—The corrugated mucous membrane in the vault of the pharynx contained several rather large caseous nodules.

Tongue.—In the mucous membrane at the base of the tongue there was a small ulcerated caseous nodule.

Tonsils.—The tonsils contained numerous caseous nodules similar to those in the peripheral lymphatic glands.

Retro-pharyngeal Glands.—The retro-pharyngeal glands were closely beset with firm greyish yellow nodules with minute calcareous centres, the largest 5 mm. in diameter. These in several places had coalesced to form larger nodules.

The Submaxillary, Hyoid, and Subparotid Glands were similar.

Trachea.—The mucous membrane of the trachea showed two superficial caseous areas, the largest 5 mm. in length, with congested margins and ulcerated surface.

Testes.—Normal.

Eyes.—Normal.

Various Lymphatic Glands.

Precrural, Popliteal, Gluteal and Ischiatic, Pubic.—All contained nodules similar to those in the pharyngeal glands. They were mostly discrete, but as in the latter were occasionally found aggregated together; the nodules in the glands closely resembled those in the spleen.

Microscopic Examination.

Caseous pus from Tuberculous Ulcer on Tongue.—Tubercle bacilli.

CALF 1109. Virus H. 60. "W.B."

Subcutaneous inoculation of culture derived from the human bronchial glands through Guinea-pig 1825.

Dose—10·0 milligrammes.

Date of Inoculation—August 3, 1906. [Age about 11 weeks.]

Died—September 4, 1906. [32 days after inoculation.]

Clinical Notes.—The course of the disease was similar to that frequently seen after the injection of 10·0 mg. of a virulent virus.

Temperature.—The temperature rose to 39·6° C. on the 10th day, reached 40·7° C. on the 19th day, and 41·3° C. on the 29th day. The temperature remained at 41·3° C. for two days; on the day after the calf was dead.

Tuberculin Test.—The calf was not tested subsequent to inoculation.

Weights.

	cwt.	qrs.	lbs.
August 3, 1906 ...	1	0	10
September 4, 1906 ...	0	3	24

Total loss of weight.—14 lbs.

Average rate of loss per week.—3 lbs.

POST-MORTEM EXAMINATION.

The carcass was thin.

Local Lesion.—At the seat of inoculation on the right side of the neck there was a small flat tumour, 14 by 9 by 4 cm. It consisted of fibro-necrotic tissue between the skin and muscle. There was but little infiltration of these structures.

Right Prescapular Gland.—The right prescapular gland was enlarged, and measured 9·5 by 5 by 4·5 cm. It was caseo-necrotic throughout.

Right Prepectoral Gland.—The prepectoral gland, as large as a cherry, was similar.

The Left Prescapular and both Axillary Glands were enlarged, and contained numerous small caseous tubercles.

Thorax.

Pleura.—There were numerous little early tubercles on the costal pleura.

Lungs.—The lungs were heavy, and weighed 6 lbs. 8 ozs. The anterior and inferior parts were dark red and consolidated; only a small portion above and behind contained any air. The surfaces of the organ were studded before and behind with opaque grey tubercles, and its substance was packed with them.

Peribronchial Glands.—The peribronchial glands were enlarged and caseating.

Thoracic Glands.—The thoracic glands were moderately enlarged, and infiltrated with a caseous moss-like network.

Heart.—There was a single tubercle in the muscular wall of the left auricle.

Abdomen.

Omentum and Peritoneum.—There were some little bright red tubercles on the omentum.

Intestines.—Many small yellow tuberculous foci were seen in the mucous membrane of the small intestine.

In the caecum and commencement of the large intestine were numerous minute ulcers surrounded by zones of congestion.

Mesenteric Glands.—The mesenteric glands contained numerous tubercles, tending to become confluent, in the cortex.

Spleen.—The spleen was enlarged, and weighed 15 ozs. It was thickly packed with tubercles.

Liver.—The liver was large. Its surface was studded with small prominent tubercles up to 1 mm. in diameter, and numerous smaller foci could be seen through its capsule Section showed minute grey opaque tubercles scattered fairly thickly throughout.

Portal Glands.—The portal glands resembled the thoracic.

Kidneys.—Many small grey tubercles were seen in the cortex of each kidney.

Suprarenal Bodies.—The suprarenal bodies contained caseous tubercles.

Lumbar Glands.—The lumbar glands were infiltrated with a caseating network.

Iliac Glands.—The iliac glands were enlarged, and contained numerous small caseous tubercles.

Special Glands.

Precrural.—The precrural glands were enlarged, and contained numerous small caseous tubercles.

Pubic.—The pubic glands contained numerous caseating tubercles.

Gluteal, Popliteal.—These glands resembled the precrural.

Ischiatic.—These contained numerous small caseating tubercles.

Submaxillary, Parotideal, Retro-pharyngeal, Hyoid.—All contained numerous small caseating tubercles.

Tonsils.—The tonsils appeared to be normal.

Naso-Pharynx.—Tubercles were seen in the naso-pharynx.

Larynx, Trachea.—There were one or two tubercles in the larynx and trachea.

Testes.—Normal.

Eyes.—Normal.

Microscopical Examination.

Ulcer from Large Intestine.—Tubercle bacilli numerous.

CALF 1049. Virus H. 60. "W.B."

Subcutaneous inoculation of culture derived from the human mesenteric glands through Guinea-pig 1829.

Dose—50·0 milligrammes.

Date of Inoculation—May 1, 1906. [Age about 10 weeks.]

Killed when in good health—August 3, 1906. [94 days after inoculation.]

Clinical Notes.

A small fluctuating tumour developed at the seat of inoculation, which afterwards opened and discharged caseo-purulent contents; the adjacent prescapular gland became slightly enlarged. The calf remained well during the experiment.

Temperature.—There was a very slight rise of temperature commencing on the 10th day after inoculation, lasting 6 days, and reaching a maximum of 39·6° C. Subsequently the temperature was normal.

Weights.

	cwt.	qr.	lbs.
May 1, 1906	1	0	0
August 3, 1906 ...	1	1	21

Total gain of weight.—1 qr. 21 lbs.

Average rate of gain per week.—3·7 lbs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—At the seat of inoculation, on the right side of the neck, there was a small swelling with a central depression. Section showed a scar in the skin, and beneath it some dense fibrous tissue containing some calcareous grains.

Right Prescapular Gland.—The right prescapular gland was slightly enlarged, and at one end were a good many widely scattered calcareous grains.

Prepectoral, Axillary, and Left Prescapular Glands.—Normal.

Thorax.

Pleura, Lungs, Thoracic Glands, Heart.—Normal.

Abdomen.

Omentum, Intestines, Mesenteric Glands, Spleen, Liver, Portal Glands.—Normal.

Kidneys; Suprarenal Bodies; Renal, Lumbar, and Iliac Glands.—Normal.

Tongue, Pharynx, Palate, Tonsils.—Normal.

Eyes.—Normal.

Testes.—Normal.

Various Lymphatic Glands.

Precrural and Popliteal, Gluteal and Ischiatic, Pubic, Submaxillary and Parotideal, Retro-pharyngeal and Hyoid.—Normal.

CALF 1053. Virus H. 60. "W.B."

Subcutaneous inoculation of culture derived from the human mesenteric glands through Guinea-pig 1830

Dose—650·0 milligrammes.

Date of Inoculation—May 1, 1906. [Age about 10 weeks.]

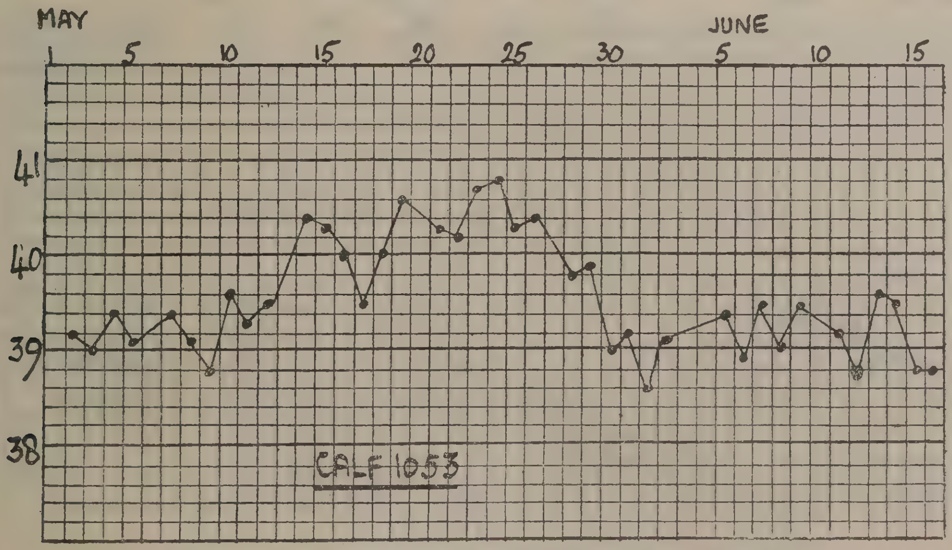
Killed when in good health—August 4, 1906. [95 days after inoculation.]

Clinical Notes.

A large fluctuating pendulous tumour developed at the seat of inoculation, and the adjacent prescapular gland became enlarged.

For several weeks the general health of the calf was poor and it suffered from respiratory trouble; it had, however, completely recovered when killed.

Temperature. (Chart to June 16.)



From June 16 to August 4 the temperature was approximately normal.

Weights.

	cwt.	qr.	lbs.
May 1, 1906	1	0	1
August 4, 1906 ...	1	1	12

Total gain of weight.—1 qr. 11 lbs.

Average rate of gain per week.—2·9 lbs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—At the seat of inoculation on the right side of the neck there was a large pendulous bag of fluid. One could almost tie a string round its neck. It measured 14 by 10·2 by 7 cm., and weighed 1 lb. 10 ozs.

It consisted of a cavity surrounded by a capsule of dense white fibrous tissue about $\frac{1}{6}$ in. thick, lined with flakes of caseous matter and containing purulent curdy fluid.

Right Prescapular Gland.—The right prescapular gland was moderately enlarged. It measured 7·5 by 3·8 by 2·5 cm., and contained one large and several smaller fibro-calcareous nodules.

Right Prepectoral Gland.—The right prepectoral gland could not be found.

Axillary and Left Prescapular Glands.—Normal.

Thorax.

Pleura.—Normal.

Lungs.—The lungs contracted well. There were only very small areas of carnification in the anterior lobes. There was a fibrous nodule with a little caseous centre on the upper surface of the right lung. It shelled out cleanly. There were several minute translucent tubercles, and in addition the lungs were everywhere faintly mottled with little irregular pale brownish grey points.

Thoracic Glands, Heart.—Normal.

Abdomen.

Peritoneum, Omentum, Intestines.—Normal.

Mesenteric Glands.—Several contained one or more small caseous foci.

Spleen, Liver, Portal Glands, Kidneys, Suprarenal Bodies, Renal Glands, Lumbar Glands, Iliac Glands.—Normal.

Genito-Urinary System.

Mammary Gland, Uterus.—Normal.

Special Glands.

Precrural, Gluteal.—Normal.

Ischiatic.—The right contained one or two small caseous tubercles. The left was normal.

Popliteal.—Both contained one or two small caseous tubercles.

Submaxillary, Parotideal, Retro-pharyngeal, Hyoid.—Normal.

CALF 989. Virus H. 60. "W.B."

Subcutaneous inoculation of culture derived from the human meninges through Guinea-pig 1832.

Dose—50·0 milligrammes.

Date of Inoculation—March 28, 1906. [Age about 4½ months.]

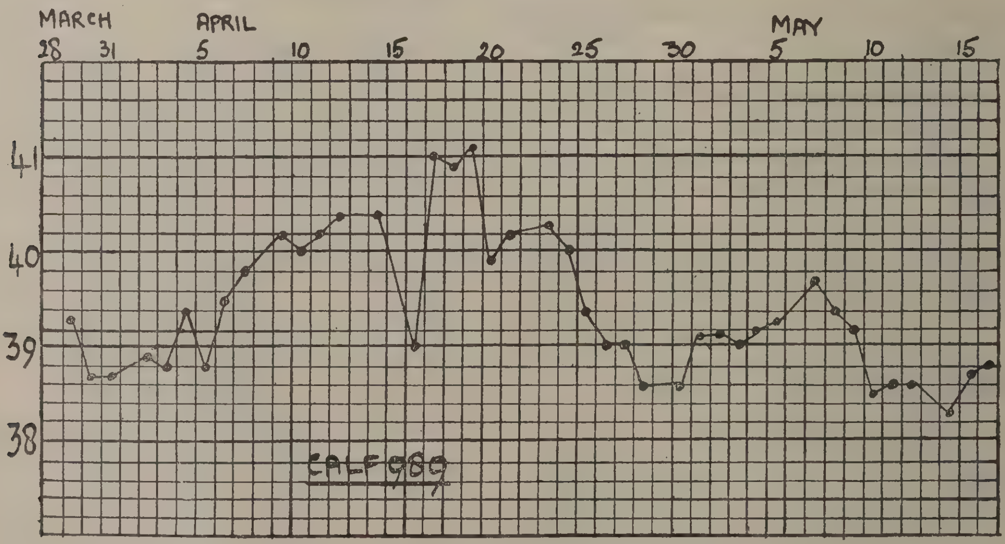
Killed when quite well—June 27, 1906. [91 days after inoculation.]

Clinical Notes.

The animal was ill during the first five weeks. It looked thin, was frequently shivering, and its respiration was increased in frequency. Its hock and knee joints were at one time considerably swollen. 11 cc. of fluid was drawn off from the right hock joint on April 28, and two guinea-pigs were injected with it. They did not become tuberculous.

During May the health and condition of the animal rapidly improved and it was quite well during the last four or five weeks of life. All swelling in the joints had disappeared by May 15.

Temperature. (Chart to May 17.)



From May 17 to June 27 the temperature was normal.

Weights.

		cwt.	qrs.	lbs.
March 28, 1906	...	1	2	16
June 27, 1906	...	2	0	23

Total gain of weight.—2 qrs. 7 lbs.

Average rate of gain per week.—4·8 lbs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—At the seat of inoculation, on the right side of the neck, was a prominent swelling, 14 by 12·7 by 7·6 cm., composed of pinkish grey fibrous tissue, thickly infiltrated by a calcareous network. A portion of it had broken down into caseopurulent fluid. It was surrounded by fibrous tissue, and did not infiltrate the skin or the subjacent muscle.

Right Prescapular Gland.—The right prescapular gland was enlarged, and measured 9·5 by 4·5 by 3·2 cm. It was largely occupied by fibro-calcareous nodules, one of which was 5 cm. in diameter, and commencing to soften at the centre.

Left Prescapular Gland, Prepectoral Glands, Axillary Glands.—Normal.

Thorax.

Pleura.—Normal.

Lungs.—The villous tufts were slightly hypertrophied on the surfaces of each lung, while those along the margins were normal. Careful inspection revealed only two minute grey tubercles in the left lung, and section revealed nothing abnormal; but on examining the organ between finger and thumb a little hard nodule was found near the dorsal margin of the left anterior lobe. It was above a third of an inch in diameter, and was composed of fibrous tissue and calcareous grains. A calcareous grain was also found in a neighbouring lobule.

Trachea, Thoracic Glands, Heart.—Normal.

Abdomen.

Peritoneum, Intestines, Mesenteric Glands, Spleen, Liver, Portal Glands, Kidneys, Suprarenal Bodies, Renal Glands, Lumbar Glands, Iliac Glands.—Normal.

Genito-Urinary System.

Testes.—Normal.

Special Glands.

Precrural, Pubic, Gluteal, Ischiatic, Popliteal, Submaxillary, Parotideal, Retro-pharyngeal, Hyoid.—Normal.

Tongue, Palate, Tonsils, Pharynx, Larynx.—Normal.

Joints.—The knee and hock joints were normal, or possibly contained a slight excess of fluid. There was no tuberculosis.

CALF 995. Virus H. 60. "W.B."

Subcutaneous inoculation of culture derived from the human meninges, through Guinea-pig 1832.

Dose—50·0 milligrammes.

Date of Inoculation—March 28, 1906. [Age about 4½ months.]

Killed when well—June 28, 1906. [92 days after inoculation.]

Clinical Notes.

A small prominent fluctuating swelling developed at the seat of inoculation, which subsequently opened and discharged caseo-purulent contents, leaving a depressed scar. The calf remained well during the experiment.

Temperature.—There was a very slight rise of temperature commencing on the 6th May, reaching a maximum of 39·9° C., and lasting ten days. Subsequently the temperature was normal.

Weights.

	cwt.	qrs.	lbs.
March 28, 1906	1	2	16
June 28. 1906	2	1	14

Total gain of weight.—2 qrs. 26 lbs.

Average rate of gain per week.—6·3 lbs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—At the seat of inoculation on the right side of the neck there was a depressed scar, situated in thickened skin over a small cavity which contained softened caseous matter and was surrounded by dense fibrous walls, packed on the surface towards the cavity with calcareous grains.

Right Prescapular Gland.—The right prescapular gland was enlarged, and contained a fibrous nodule about an inch in length including scattered calcareous foci, and a similar nodule about the size of a pea at the other end of the gland.

Left Prescapular Gland, Prepectoral Glands, Axillary Glands.—Normal.

Thorax.

Pleura, Heart, Lungs.—Normal.

Thoracic Glands.—In each of the three thoracic glands one or two minute calcareous specks were found.

Abdomen.

Peritoneum, Intestines.—Normal.

Mesenteric Glands.—A few minute calcareous specks were seen in two or three of these glands.

Spleen, Liver, Portal Glands, Kidneys, Suprarenal Bodies, Renal Glands, Lumbar Glands, Iliac Glands.—Normal.

Testes.—Normal.

Tongue, Palate, Tonsils, Pharynx.—Normal.

Special Glands.

Precrural, Pubic, Gluteal, Ischiatic, Popliteal, Submaxillary, Parotideal, Retro pharyngeal, Hyoid.—Normal.

CALF 1081. Virus H. 60. "W.B."

Subcutaneous inoculation of culture derived from the human lung through Guinea-pig 1827.

Dose—50·0 milligrammes.

Date of Inoculation—May 22, 1906. [Age about 18 weeks.]

Killed when in good health—August 20, 1906. [90 days after inoculation.]

Clinical Notes.

The calf remained well during the experiment.

Temperature.—The temperature rose to 39·8° C. on the 9th day after inoculation, and reached a maximum of 41·1° C. on the 18th day, after which it slowly returned to the normal; the period of high temperature lasted 28 days. Subsequently the temperature was normal.

Weights.

	cwt.	qrs.	lbs.
May 22, 1906	1	2	7
August 20, 1906	1	3	6

Total gain of weight.—27 lbs.

Average rate of gain per week.—2·1 lbs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—At the seat of inoculation, on the right side of the neck, there was a prominent tumour measuring 7·6 by 5·1 by 3·9 cm. It was composed of softened caseous matter, enclosed in a fibrous cyst lined with brownish pink tissue containing calcareous grains.

Right Prescapular Gland.—The right prescapular gland was enlarged, and measured 9·5 by 5·4 by 3·9 cm. It was almost entirely calcareous, but a portion of the gland was normal, and a portion was composed of caseo-necrotic tissue.

Left Prescapular and Axillary Glands.—Normal.

Right Prepectoral Gland.—Normal.

Thorax.

Pleura.—Normal.

Lungs.—The surface showed a small number of grey tubercles with yellow centres. The larger of these were distinctly raised, and as much as 2 mm. in diameter. They were irregular or rectilinear in outline. A few were seen on section. In the left lung there was in addition a fibrous nodule, 2 by 0·7 cm., fibrous and translucent, and packed with yellow calcareous grains.

Thoracic Glands.—In the left bronchial gland was found a single tubercle, a little over 1 mm. in diameter, slightly calcareous. The other thoracic glands were normal.

Heart.—Normal.

Abdomen.

Omentum and Peritoneum.—Normal.

Intestines and Mesenteric Glands.—Normal.

Spleen.—In the spleen were found two rather large tubercles.

Liver.—On the surface of the liver there were six or eight small yellowish tubercles about 1 mm. in diameter. In the substance two similar tubercles were found.

Portal Glands.—Two minute tubercles were found in these glands.

Kidneys and Suprarenal Bodies.—Normal.

Renal and Lumbar Glands.—A minute tubercle was found in a renal gland, and another in a lumbar.

Testes.—Normal.

Tongue, Pharynx, Palate, Tonsils.—Normal.

Eyes.—Normal.

Various Lymphatic Glands.

A minute tubercle was found in the *right precrural.*

Left Precrural, Popliteal, Gluteal and Ischiatic, Pubic, Retro-pharyngeal and Hyoid; Submaxillary and Parotideal.—Normal.

RHESUS MONKEY 79. Virus H. 60. "W.B."

(A young animal.)

Fed with culture derived from the human mesenteric glands through Guinea-pig 1829.

Dose—0·1 milligramme. [The mouth pouches were full of food and some difficulty was experienced in feeding the animal. The dose was given by means of a graduated pipette.]

Date of Inoculation—May 1, 1906.

Died—July 24, 1906. [84 days after feeding.]

Weight at Death—1780 grammes.

POST-MORTEM EXAMINATION.

The carcass was thin.

Tongue, Pharynx, and Larynx.—Normal.

Retro-pharyngeal Glands.—These glands contained caseous foci.

Submaxillary Glands.—The submaxillary glands could not be seen.

Abdomen.

Stomach.—Normal.

Intestines.—Two small tubercles were seen in the duodenum. There was a small ulcer with a caseous floor in the commencement of the colon. There was a much smaller caseous ulcer in the rectum.

Mesenteric Glands.—A gland near the pylorus contained several caseous foci. There was a caseous gland about the size of a pea closely attached to the colon just beyond the entrance of the ileum (near the ulcer in the colon mentioned above).

The other mesenteric and the colic glands were normal

Peritoneum and Omentum.—There were numerous minute tubercles in the omentum, some very recent. The somatic peritoneum was normal.

Spleen.—The spleen was enlarged and closely studded with prominent pea-sized yellow tubercles, caseous and softened at their centres.

Liver.—The liver contained innumerable minute yellow tubercles.

Portal Glands.—No portal glands were seen.

Diaphragm.—There were caseous adhesions between the liver and the right side of the diaphragm, near the suprarenal. This side of the diaphragm was caseous throughout its whole thickness.

Kidneys.—There were a few small caseous tubercles in each kidney.

Suprarenal Bodies.—Normal.

Pancreas.—A tubercle was seen in the substance of the pancreas, and two on its surface.

Thorax.

Lungs.—The whole of the right lung was intimately adherent to the costal pleura, which was thickened and caseous.

The lower lobe of this lung was dark purple in colour, and contained very little air.

The upper lobe was caseous throughout, and formed a solid yellow mass an inch or more in diameter.

The left lung contained only a few small scattered tubercles.

Bronchial Glands.—The bronchial glands were probably incorporated with the caseous mass already mentioned.

Heart.—Normal.

Thymus.—There was a very small focus, ? a tubercle, in the thymus.

RHESUS MONKEY 81. Virus H. 60. "W.B

(A young animal.)

Fed with culture derived from the human mesenteric glands through Guinea-pig 1829.

Dose—1·0 milligramme.

Date of Inoculation—May 1, 1906.

Died—June 20, 1906. [50 days after feeding.]

Clinical Notes.

For a fortnight or more before this animal died it was noticed that it suffered from respiratory obstruction on exertion. Thus, being very nervous at the approach of anybody, it leapt from side to side of the cage, and after this inspiration was accompanied by retraction of the lower part of the sternum and a crowing noise as in croup.

The monkey gradually got pale and thin, but no other symptoms were observed.

ABSTRACT OF POST-MORTEM NOTES.

General Tuberculosis.

The Tongue and Pharynx appeared normal.

The Retro-pharyngeal Glands were enlarged, soft, and caseous.

Cervical Glands.—At the base of the neck, in the middle line below, was a large gland similar on section; other small caseous cervical glands were also seen.

The Thyroid was packed with tubercles.

The Intestines and Mesenteric Glands were normal.

Lungs.—Both lungs contained a few small tubercles, and the right showed also some very large deep-seated caseous masses.

The Bronchial Glands were very large caseous and softened.

There were many caseous tubercles in the *Spleen*, a moderate number in the *Liver*, and very few in the *Kidneys*.

RHESUS MONKEY 83. Virus H. 60. "W.B."

Fed with culture derived from the human mesenteric glands through Guinea-pig 1829.

Dose—1·0 milligramme.

Date of Inoculation—May 1, 1906. [A young monkey, yet considerably larger than 79 or 81.]

Died—June 26, 1906. [56 days after feeding.]

POST-MORTEM EXAMINATION.

The carcass was thin.

Tongue, Tonsils, Larynx, Submaxillary Glands (Lymphatic and Salivary), Subparotid Salivary Glands, and Cervical Glands.—Normal.

Retro-pharyngeal Glands.—One contained a caseous focus, the other was normal.

Abdomen.

Oesophagus and Stomach.—Normal.

Intestines.—The small intestine was normal. One small tubercle was seen in the mucous membrane of the large intestine.

Mesenteric Glands.—Normal.

Meso-Colic Glands.—One contained a small caseous focus.

Peritoneum.—Normal.

Spleen.—The spleen was enlarged, and contained a large number of caseous nodules, irregular in size, and softened at their centres, the largest being a sixteenth of an inch in diameter.

Liver.—The liver showed a considerable number of small tubercles lying just under the capsule. They were particularly numerous in the right lobe. A few larger than the rest, were nearly an eighth of an inch in diameter. All were caseous, and the larger ones were already softened at the centres.

Portal Glands.—The portal glands were normal in size, and contained an occasional small caseous focus.

Kidneys.—The left was normal. The right contained a caseous tubercle in its cortex.

Suprarenal Bodies.—Each contained several small tubercles.

Renal Glands.—A renal gland on the right side was normal.

Coeliac Glands.—The coeliac glands contained an occasional small caseous focus.

Lumbar and Iliac Glands.—Normal

Inguinal Glands. — The left contained a small caseous focus. The right was normal. The glands at the inner end of the inguinal canal were normal.

Thorax.

Pleura.—On the costal pleura, along the lines of the ribs, were some caseous tubercles to which the lungs were attached. With the upper portion of the pleura on the left side the caseous portion of the lung was entirely incorporated.

Lungs.—The lungs were severely affected. On both sides they were adherent to the costal and mediastinal pleura, and it was noticed that the adhesions were chiefly along the lines of the ribs, a situation similar to that where tubercles are common in the pleura of the calf. On the right side the adhesions were for the most part easily broken, but almost the whole of the left upper lobe was so firmly adherent that it was impossible to separate it. This lobe consisted entirely of a mass of soft caseous tissue, which readily broke down when touched. The left lower lobe was air-containing and emphysematous. In the dorsal portion of it there was a large and soft caseous nodule three quarters of an inch in diameter. Besides this there were a few small scattered caseous tubercles. On the right the lobes were adherent to one another. The upper and lower parts contained air, and occasional small caseous tubercles. What appeared to correspond to the middle lobe in the human subject was, like the left upper lobe, entirely caseous, but not quite so soft.

Trachea.—Normal.

Bronchial Glands.—The bronchial glands were greatly enlarged, and some entirely softened.

Heart.—There were numerous subserous hæmorrhages in the walls of the right ventricle. No tubercles were seen in the heart.

Brain.—There was a small hæmorrhage under the pia mater on the upper surface of the left hemisphere, and another on the under surface of the left temporo-sphenoidal lobe. There were no tubercles.

Microscopical Examination.

Left Inguinal Gland (focus from).—Tubercle bacilli.

VIRUS H. 67. "E.P."

MULTIPLE TUBERCULOSIS OF BONES.

VIRUS H. 67. "E.P."

CULTURE INOCULATIONS, OCTOBER 26, 1906.

The strain was derived from the original material (pus from a scapular abscess), through G.P. 1914, and had been in artificial cultivation a total period of 108 days.

The culture used was the 4th generation, 21 days old.

BULL-CALF 1169.

Subcutaneous.
Dose : 50·0 mg.
Killed : Jan. 24, 1907.
90 days.

P.M.—At the seat of inoculation was a fibrous-walled cyst with caseo-purulent contents. The left prescapular gland was caseo-necrotic almost throughout. A very few small tubercles were seen on the surface of the lungs. Most of the lymphatic glands of the body contained one or more small tubercles.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
963	Intrav.	1·0 mg.	D. 113 days	Chronic G. T.
964	Intrav.	0·1 mg.	K. 126 "	T. of lungs and kidneys.
959	Intrap.	10·0 mg.	K. 126 "	Slight G. T.
960	Intrap.	1·0 mg.	K. 126 "	
961	Subcut.	10·0 mg.	K. 126 "	Local lesion. Slight T. of lungs.
962	Subcut.	1·0 mg.	K. 126 "	

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
1966	Intrap.	1·0 mg.	D. 47 days	G. T.
1964	Intrap.	0·1 mg	D. 24 "	Slight G. T.
1965	Subcut.	1·0 mg.	D. 165 "	Chronic G. T.
1963	Subcut.	0·1 mg.	D. 76 "	Slight G. T. with pseudo-tuberculosis.

BULL-CALF 1173.

Subcutaneous.
Dose : 50·0 mg.
Killed : Mar. 12, 1907.
137 days.

P.M.—Fibrous tumour at seat of inoculation, with central cavity containing caseo-pus. There was a small caseous nodule and a few calcareous tubercles in the left prescapular gland and no tuberculosis elsewhere.

VIRUS H. 67. "E.P."
CALF PASSAGE.
CULTURE.

Derived from the original material through Guinea-pig 1914. Inoculated on October 26, 1906, after 108 days cultivation, into—

CALF 1173.

Subcutaneous.
Dose: 50·0 mg.
Killed: March 12, 1907. 137 days.

P.M.—Fibrous local tumour with central cavity containing caseo-pus and turbid fluid. A small caseous nodule, and calcareous tubercles and foci, in prescapular gland. No tuberculosis elsewhere.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
963	Intrav.	1·0 mg.	D. 113 days	Chronic G. T.
964	Intrav.	0·1 mg.	K. 126 ,,	T. of lungs and kidneys.
959	Intrap.	10·0 mg.	K. 126 ,,	Slight G. T.
960	Intrap.	1·0 mg.	K. 126 ,,	
961	Subcut.	10·0 mg.	K. 126 ,,	Local lesion. Slight T. of lungs.
962	Subcut.	1·0 mg.	K. 126 ,,	

CALF 1169.

Subcutaneous.
Dose: 50·0 mg.
Killed: January 24, 1907.
90 days.

P.M.—At the seat of inoculation was a fibrous-walled cyst with caseo-purulent contents. The left prescapular gland was caseo-necrotic almost throughout. A very few small tubercles were seen on the surface of the lungs. Most of the lymphatic glands of the body contained one or more small tubercles.

Emulsion of Prescapular Gland (estimated to contain 1,726,000 T.B. per cc.).

DOG 23 (PUPPY).

Intraperitoneal.
Dose: 17,260,000 T. B.
Killed: 111 days.

P.M.—Fibrous nodule at seat of inoculation. Tubercles, small and very scanty, in the liver; a group of 20 were seen in the lung. The pyloric gland contained two small foci.

CALF 1143.

Subcutaneous.
Estimated dose: 17,260,000 T. B.
Killed: May 14, 1907.
110 days.

P.M.—No local lesion; four caseous gritty tubercles in the left prescapular gland only.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1118	Subcut.	1,726,000 T. B. each.	K. 118 days	Very slight T.
1119	Subcut.		K. 118 ,,	Local lesion. Slight T. of lungs.

Emulsion of prescapular gland into:
GUINEA-PIGS 2296-2298.
Killed: 28 days. Slight T.

APRIL 9, 1907. Emulsion of G.P.'s tissues (T. B. fairly numerous).

CALF 1201.

Subcutaneous.
Dose: 8·0 cc. of emulsion.
Killed: July 8, 1907. 90 days.

P.M.—Small cystic tumour at seat of inoculation. About half the left prescapular gland was composed of caseo-calcareous masses. There was no tuberculosis elsewhere.

RABBIT 1242.

Subcutaneous.
Dose: 1·0 cc.
Killed: 107 days.

P.M.—Local lesion and tuberculosis of lungs.

Emulsion of prescapular gland into:
GUINEA-PIGS 2492-2494-2495.
Killed: 25 days. Early G. T.

AUGUST 2, 1907. Emulsion of G.P.'s tissues (T. B. not numerous).

CALF 1261.

Subcutaneous.
Dose: 10·0 cc. of emulsion.
Killed: November 27, 1907. 117 days.

P.M.—Small fibrous patch with a few calcareous grains at seat of inoculation, and two or three calcareous tubercles in left prescapular gland only.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1406	Subcut.	1·0 cc.	K. 120 days	Slight G. T.
1407	Subcut.	2·0 cc.	K. 120 ,,	Local T. only.

Emulsion of prescapular gland into:
GUINEA-PIGS 2781-2783.
Killed: 38 days. Early G. T.

JANUARY 4, 1908. Emulsion of G.P.'s tissues (T. B. sparsely scattered).

CALF 1329.

Subcutaneous.
Dose: 20·0 cc. of emulsion.
Killed: April 29, 1908. 116 days.

P.M.—Fibroid and caseous local tumour. Left prescapular gland extensively calcareo-caseous. The lungs were moderately closely beset with minute gritty glassy tubercles; three were seen in the liver, one in the heart. The thoracic, mesenteric, one portal, and two ileo-colic glands contained small scattered calcareous tubercles.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1643	Subcut.	About 4·0 cc.	K. 223 days	Local lesion and slight T. of lungs.
1644	Subcut.	About 4·0 cc.	D. 19 ,,	Local lesion; slight T. of lungs. The cause of death was not apparent.

Emulsion of lung into:
GUINEA-PIG 3039.
Killed: 35 days. Early slight G. T.

CULTURE.

The 4th generation of Culture derived from this guinea-pig was used for inoculation on August 6, 1908, when 8 days old. Duration of artificial cultivation, 64 days.

CALF 1439.

Subcutaneous.
Dose: 50·0 mg.
Killed: November 9, 1908. 95 days.

P.M.—Fibrous-walled cyst with caseo-purulent contents at seat of inoculation. Few small calcareous patches in left prescapular gland. No tuberculosis elsewhere.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1963	Intrav.	1·0 mg.	K. 167 days	Retrogressive T. of lungs and kidneys; one tubercle in a muscle.
1964	Intrav.	0·1 mg.	K. 167 ,,	T. of one testicle; one tubercle in lung.
1965	Intrav.	0·01 mg.	D. 73 ,,	Slight T. of lungs and kidneys. ? cause of death.
1966	Subcut.	30 0 mg.	D. 91 ,,	Local lesion and a few tubercles in lungs and kidneys. Death from cellulitis.

CALF 1173. Virus H. 67. "E.P."

Subcutaneous inoculation of culture derived from the original material (scapular abcess) through Guinea-pig 1914.

Dose—50·0 milligrammes.

Date of Inoculation—October 26th, 1906.

Weight—1 cwt. 2 qrs. 10 lbs. [Age about 16 weeks.]

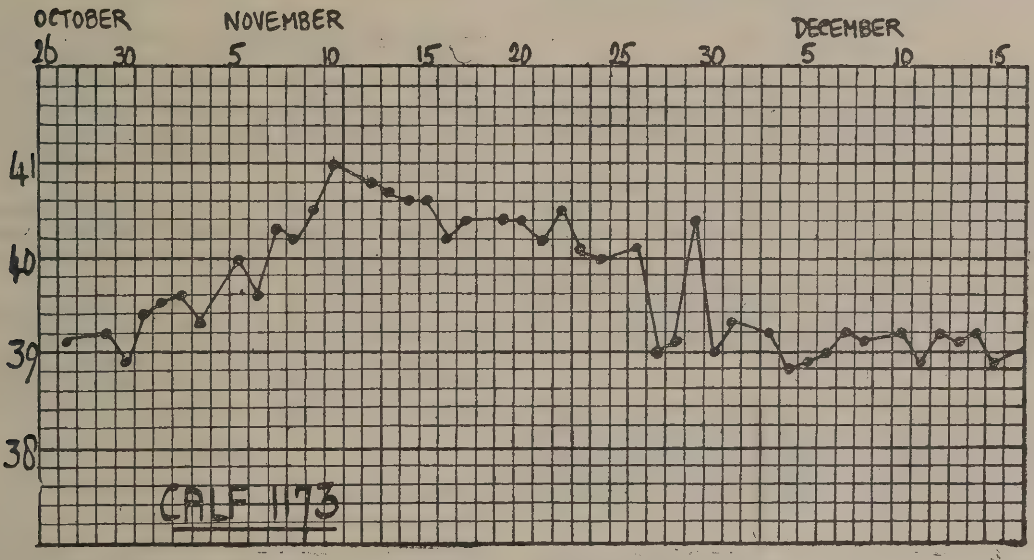
Killed when in good health—March 12, 1907. [137 days after inoculation.]

Clinical Notes.

Seventeen days after inoculation on the left side of the neck there was a firm rounded local tumour measuring 10 by 10 cm. by a little over 2·5 cm., fixed to the muscle. The adjacent prescapular gland was enlarged, 11·5 cm. in length; the left prepectoral gland was the size of a walnut. During the following month the tumour and gland diminished in size; on the 42nd day the former measured 9 cm. in longest diameter, as also did the latter. The prepectoral gland was the size of a marble. The tumour was adherent to the skin, and infiltrated the muscle.

The calf remained in good health during the experiment, and gained weight normally. It was killed 137 days after inoculation.

Temperature. (Chart to December 15.)



From December 15 to March 12, when the calf was killed, the temperature remained normal.

Tuberculin Test.—January 31st, 97 days after inoculation. Slight reaction (?). Rise of temperature, 0·7° C.

Weights.

			cwt.	qrs.	lbs.
October 26, 1906	...	...	1	2	10
March 12, 1907	...	...	3	0	24

Total gain of weight.—1 cwt. 2 qrs. 14 lbs.

Rate of gain per week.—9·2 lbs.

POST-MORTEM EXAMINATION.

General Condition.—Good.

Local Lesion.—At the seat of inoculation, on the left side of the neck, there was a roughly hemispherical firm circumscribed tumour measuring 6 by 5 by 3 cm.; on section it was composed of dense cicatricial fibrous tissue surrounding a multilocular cavity filled with caseo-pus and turbid watery fluid; the cavity was lined internally with vascular granulation tissue; the skin over the swelling was very thick and firmly adherent.

Left Prescapular Gland.—The left prescapular gland measured 5 by 3 by nearly 2 cm.; a patch of the cortex at one extremity was cicatricial and contained one hemp seed sized softened caseous nodule and a few calcareous grains; at the other extremity the cortex showed a group of 4 or 5 calcareous tubercles, the largest the size of a millet seed, embedded in somewhat fibroid glandular tissue.

Right Prescapular Gland.—The right prescapular gland measured 5 by 3 by 1·5 cm. It was normal on section.

Prepectoral, Cervical, and Axillary Glands.—Normal.

Thorax.

Pleura, Lungs, Thoracic Glands, Pericardium, Heart—Normal.

Abdomen.

Omentum and Peritoneum, Spleen and Liver, Portal Glands, Kidneys, Suprarenals, Renal, Lumbar, and Iliac Glands.—Normal.

Alimentary Tract.

Tongue, Pharynx, Palate, and Tonsils.—Normal.

Submaxillary, Retropharyngeal, Parotid and Hyoid Glands.—

Intestines.—Normal.

Mesenteric Glands.—Normal.

Testes.—Normal.

Eyes.—Normal.

Various Lymphatic Glands.

Precrural, Popliteal, Gluteal, Ischiatic, and Pudic.—Normal.

Microscopical Examination.

Emulsion of Prescapular Gland.—Tubercle bacilli, a very few seen.

Animals Inoculated.

Guinea-pig 2294 was inoculated intraperitoneally with an emulsion of the spleen. It was killed after 71 days and found to be healthy.

Four guinea-pigs, Nos. 2295–2298 were inoculated intraperitoneally with an emulsion of the prescapular gland. All became tuberculous.

CALF 1169. Virus H. 67. "E.P."

Subcutaneous inoculation of culture derived from the original material (pus from scapular abscess) through Guinea-pig 1914.

Dose—50·0 milligrammes.

Date—October 26, 1906.

Weight at Inoculation—1 cwt. 3 qrs. 14 lbs. [Age about 18 weeks.]

Killed when in good health—January 24, 1907. [90 days after inoculation.]

Clinical Notes.

Seventeen days after inoculation there was a firm local tumour on the left side of the neck, measuring 10 by 7 cm. by about 2·5 cm. The left prescapular gland was enlarged, 11·5 cm. in length.

Forty-two days after inoculation the tumour measured 10 by 7·5 by 3·2 cm., and was soft and doughy in the upper part. The prescapular gland was 10 cm. in length.

Subsequently the tumour became soft and fluctuating all over. The calf remained in good health during the experiment, and grew normally. It was killed 90 days after inoculation.

Temperature.—The temperature rose on the 12th day to 40·1° C. and reached a maximum of 40·5° C. on the 13th day. It remained high for three weeks, and then fell to the normal. It was quite normal during the remaining period of the experiment (8 weeks).

Tuberculin Test.—The calf was not tested subsequent to the inoculation.

Weights.

The calf grew normally during the experiment.

	cwt.	qrs.	lbs.
October 26, 1906	1	3	14
January 24, 1907	2	3	7

Total gain of weight during the experiment.—3 qrs. 21 lbs.

Average rate of gain per week.—8 lbs.

POST-MORTEM EXAMINATION.

General Condition.—Very good.

Local Lesion.—In the subcutaneous tissues on the left side of the neck there was a rounded fluctuating tumour weighing with attached skin 10 ozs., and measuring 8·2 by 7 by 6·5 cm.; on section it was found to be a cyst, with a dense white fibrous wall 1 cm. in greatest thickness, and caseo-purulent contents; on washing away the pus some firm caseous masses remained attached to the wall, and fibrous trabeculæ were seen stretching across the cavity; the capsule was lined internally with purulent granulation tissue in which were embedded calcareous grains and small calcareous nodules; the skin over the tumour was thickened.

Left Prescapular Gland.—The left prescapular gland was enlarged, measuring 7·5 by 3·8 by 3·2 cm., very hard and somewhat irregular in outline; on section it was composed almost throughout of dense pinkish-yellow caseo-necrotic substance, gritty chiefly around the marginal parts; the caseous substance contained some small dense cicatricial patches and a small cavity filled with caseo-pus; very little glandular tissue remained, and this, a narrow zone just under the capsule, was beset with discrete caseo-calcareous tubercles.

Prepectoral Glands.—The right and left prepectoral glands contained sparsely scattered calcareous tubercles ranging in size from a mere point to that of a millet seed.

Right Prescapular Gland.—The right prescapular gland contained one minute calcareous grain.

Axillary Glands.—The left axillary gland was similar to the prepectoral glands; the right appeared normal.

Thorax.

Pleura.—Normal.

Lungs.—The lungs were pinkish and crepitant throughout, and collapsed normally. They showed under the pleura very sparsely scattered grey tubercles up to 1 mm. in diameter, the larger ones distinctly yellow and calcareous in the centre. No tubercles were seen on section.

Thoracic Glands.—The bronchial and mediastinal glands were normal in size, and showed on section scattered throughout the cortices yellow calcareous tubercles, the largest the size of a pin's head, which readily shelled out from the gland substance.

Heart.—Normal.

Abdomen.

Omentum and Peritoneum.—Normal.

Spleen.—Normal.

Liver.—The liver was normal on the surface and on section.

Portal Glands.—The portal glands were normal in size, each contained sparsely scattered calcareous foci.

Cœliac Glands.—The cœliac glands were normal in size; two showed in the cortex a few whitish calcareous tubercles, the largest the size of a pin's head.

Kidneys and Suprarenal Bodies.—Normal.

Lumbar, Iliac, and Sacro-iliac Glands.—Each contained two or three opaque yellowish calcareous tubercles, the largest about the size of a pin's head; they readily shelled out from the gland substance.

Alimentary Tract.

Tongue, Pharynx, Palate, and Tonsils.—Normal.

The Retro-pharyngeal and Sub-parotid Glands contained a few yellow calcareous tubercles, the largest the size of a millet seed.

One Submaxillary and one Cervical Gland each contained a calcareous tubercle.

Intestines.—Normal.

Mesenteric Glands.—Altogether about half a dozen calcareous tubercles were found in these glands.

Ileo-Colic Glands.—The ileo-colic glands contained fairly numerous calcareous tubercles; they were much more numerous than in the thoracic glands, and formed in places small groups.

Genito-Urinary System.

Testes.—Normal.

Peripheral Glands.

Popliteal.—The left showed in the cortex a millet-seed sized caseo-calcareous tubercle with a grey margin. There was a similar but rather smaller one in the right.

Pudic.—The left contained a caseo-calcareous focus, the size of a pin's head, and two or three calcareous grains. The right appeared normal.

Precrural.—The left showed in the cortex a soft yellow caseous tubercle rather larger than a millet seed. The right contained one or two minute calcareous tubercles.

Gluteal.—Both contained one or two minute calcareous tubercles.

Microscopical Examination.

Emulsion of Prescapular Gland.—Tubercle bacilli numerous.

Tubercle from Portal Gland.—Three tubercle bacilli seen.

Tubercle from Precrural Gland.—One tubercle bacillus seen.

Tubercle from Pharyngeal Gland.—No tubercle bacilli seen.

Animals Inoculated.

Calf 1143 ... ... Rabbits 1118–1119 ... Guinea-pigs 2203–2205 Dog 23	were inoculated with an emulsion of the left prescapular gland. (*See* Table.)

Guinea-pig 2206 was inoculated intraperitoneally with an emulsion of the spleen, and was found to have slight tuberculosis when killed 77 days later.

CALF 1143. Virus H. 67. "E.P."

Subcutaneous inoculation of emulsion made from the prescapular gland of Calf 1169.

Dose—17,260,000 T.B. (Vol. 10·0 cc. E = 1,726,000 T.B. per cc)

Date of Inoculation—January 24, 1907.

Age—About 21 weeks.

Killed when in good health—May 14, 1907. [110 days after inoculation.]

Clinical Notes.

A very small swelling arose at the seat of inoculation on the left side of the neck, but it had entirely disappeared within six weeks. The left prescapular gland at first became slightly enlarged, but subsequently no enlargement could be felt, the gland being the same size as its fellow on the right side of the neck.

The calf remained in good health during the experiment.

Temperature.—Normal throughout.

Tuberculin Test.—May 9th, 1907. [105 days after inoculation.] Reacted. Rise of temperature, 1·1° C.

Weights.

	cwt.	qrs.	lbs.
January 24, 1907	1	2	24
May 14, 1907	2	1	6

Total gain of weight.—2 qrs. 10 lbs.

Rate of gain per week.—4·1 lbs.

POST-MORTEM EXAMINATION.

Carcass.—In good condition.

Local Lesion.—There was no sign of tuberculosis at the site of inoculation.

Left Prescapular Gland.—The left prescapular gland measured 5 by 3 by 1·3 cm., and showed in the cortex four yellow softened caseous tubercles, the largest about twice the size of a millet seed; they were all slightly gritty from calcification.

Right Prescapular Gland.—(5 by 3 by 1·3 cm. Normal on section.

Prepectoral and Axillary Glands.—Normal.

Thorax.

Pleura, Lungs, Thoracic Glands, and Heart.—Normal.

Abdomen.

Omentum and Peritoneum, Liver, Portal Glands, Spleen, Kidneys, and Suprarenal Bodies; Renal, Lumbar, and Iliac Glands.—Normal.

Alimentary Tract.

Tongue, Pharynx, Palate, and Tonsils; Submaxillary, Pharyngeal, Hyoid, and Parotideal Glands; Intestines; Mesenteric Glands.—Normal.

Testes.—Normal.

Various Lymphatic Glands.

Precrural, Popliteal, Gluteal, Ischiatic, and Pudic.—Normal.

Microscopical Examination.

Emulsion of prescapular gland; two tubercle bacilli seen.

Animals Inoculated.

Two guinea-pigs, Nos. 2438 and 2439, were intraperitoneally inoculated with an emulsion of the prescapular gland. They died of general tuberculosis in 111 and 186 days respectively.

CALF 1201. Virus H. 67. "E.P."

Subcutaneous Inoculation of an emulsion of various tissues from three guinea-pigs (2296–2298) infected from the prescapular gland of Calf 1173.

Dose—8·0 cc. of emulsion containing fairly numerous tubercle bacilli.

Date of Inoculation—April 9, 1907. [Age about 16 weeks.]

Killed when in good health—July 8, 1907. [90 days after inoculation.]

Clinical Notes.

A tumour of moderate size developed at the seat of inoculation on the left side of the neck. On April 19 it was firm and raised, measuring 9 by 5·5 by about 2·5 cm. The adjacent prescapular gland was at this time slightly enlarged, measuring 6 cm. in length.

On May 14 the tumour was prominent and doughy, measuring 8 by 5·5 cm.; the gland was 7·5 cm. in length. No further changes of importance took place in the local conditions.

The calf remained well during the experiment.

Temperature.—There was a very slight rise of temperature during the second and third weeks after inoculation (maximum 39·6° C.), otherwise the temperature was normal.

Tuberculin Test.—July 5, 1907. [87 days after inoculation.] Reacted. Rise of temperature, 1·6° C.

Weights.

	cwt.	qrs.	lbs.
April 9, 1907	1	1	14
July 8, 1907	1	3	24

Total gain of weight.—2 qrs. 10 lbs.

Average rate of gain per week.—5 lbs.

POST-MORTEM EXAMINATION.

Carcass in good condition.

Local Lesion.—At the seat of inoculation there was a cystic tumour measuring 9 by 6 by 4 cm. with fibrous walls lined internally with granulation tissue and thick tenacious caseo-purulent contents; the cavity of the cyst was crossed by fibrous tissue trabeculae.

Left Prescapular Gland.—The left prescapular gland measured 6·5 by 3 by 2 cm., and on section showed about half its substance replaced by irregular caseo-calcareous masses, one towards one extremity large, the others small.

Right Prescapular Gland.—The right prescapular gland measured 5·5 by 3 by 1·3 cm. and was slightly enlarged and oedematous.

Prepectoral and Axillary Glands.—Normal.

Thorax.

Pleura, Lungs, Heart, Thoracic Glands.—Normal.

Abdomen.

Peritoneum and Omentum, Spleen, Liver, Portal Glands, Kidneys and Suprarenal Bodies, Renal, Lumbar, and Iliac Glands.—Normal.

Alimentary Tract.

Tongue, Pharynx, Palate, Tonsils.—Normal

Intestines and Mesenteric Glands.—Normal.

Various Lymphatic Glands.

Submaxillary, Retropharyngeal, Hyoid, Parotideal, Precrural, Popliteal, Gluteal, and Ischiatic.—Normal.

Genito-Urinary System.

Mamma, and Supramammary Lymphatic Glands.—Normal.

Microscopical Examination.

Emulsion of Prescapular Gland.—Tubercle bacilli moderately numerous.

Animals Inoculated.

Four guinea-pigs, Nos. 2492–2495, were inoculated intraperitoneally with an emulsion of the left prescapular gland. All became tuberculous.

CALF 1261. Virus H. 67. "E.P."

Subcutaneous inoculation of an emulsion made from the omenta and the pyloric portal coeliac and sternal glands of three guinea-pigs (2492–2494–2495) inoculated with the prescapular gland of Calf 1201.

Dose—10·0 cc. of the emulsion; tubercle bacilli were not numerous in it.

Date of Inoculation—August 2, 1907. [Age about 14 weeks.]

Killed when in good health—November 27, 1907. [117 days after inoculation.]

Clinical Notes.

A very slight thickening developed at the seat of inoculation on the left side of the neck and the prescapular gland became a little enlarged. In November the thickening had disappeared and the prescapular gland was normal in size. The calf remained in good health during the experiment.

Temperature.

Approximately normal throughout.

Tuberculin Test.

October 24, 1907. [83 days after inoculation.] Reacted. Rise of temperature, 1·4° C.

Weights.

	cwt.	qrs.	lbs.
August 2, 1907...	1	1	3
November 27, 1907	2	1	8

Total gain of weight.—1 cwt. 5 lbs.

Average rate of gain per week.—7 lbs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—In the subcutaneous tissues at the seat of inoculation there was a small flat patch of fibrous tissue, not more than 1 cm. in diameter, containing a few calcareous grains.

Left Prescapular Gland.—The left prescapular gland was not enlarged; it showed in the cortex two or three yellow calcareous tubercles, the largest the size of a millet seed.

Right Prescapular, Prepectoral and Axillary Glands.—Normal.

There was no sign of tuberculosis elsewhere.

Microscopical Examination.

Emulsion of Tubercles from Left Prescapular Gland.—No tubercle bacilli.

Animals Inoculated.—Three guinea-pigs, Nos. 2781, 2782 and 2783, were inoculated intraperitoneally with an emulsion of tubercles from the prescapular gland. They were killed after 38 days and showed early general tuberculosis.

CALF 1329. Virus H. 67. "E.P."

Subcutaneous inoculation of emulsion made from the omentum and the spleen, and a few of the lymphatic glands of each of three guinea-pigs, Nos. 2781–2–3, inoculated with the prescapular gland of Calf 1261.

Dose—20·0 cc. The emulsion contained tubercle bacilli rather sparsely scattered.

Date of Inoculation—January 4, 1908. [Age about 14 weeks.]

Killed when in good health—April 29, 1908. [116 days after inoculation.]

Clinical Notes.

The calf suffered from severe constitutional disturbance during the third and fourth weeks after inoculation; it lost its appetite, and lay down frequently and refused to get up; the respiration was a little increased in frequency for several days. The calf quickly recovered, and remained well subsequently.

Temperature.

Sixteen days after inoculation the temperature rose to 40·3° C.; it remained high (between 39·7° and 40·4° C.) for 12 days and then fell to the normal. The temperature was irregular and slightly raised for a further period of 30 days; then from March 7 to April 29 it was quite normal.

Tuberculin Test.

February 21, 1908. [48 days after inoculation.] Reacted. Rise of temperature, 0·9° C.

Weights.

	cwt.	qrs.	lbs.
January 4, 1908...	1	1	3
April 29, 1908	2	0	10

Total gain of weight.—3 qrs. 7 lbs.

Average rate of gain per week.—5·5 lbs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—On the left side of the neck about the middle there was a slightly raised rounded swelling measuring 7·5 by 6 by 3·5 cm.; this on section was composed of thickened skin and a dense yellow caseous mass surrounded by a thick (up to 8·mm.) wall of fibrous tissue; the caseous mass was 1·5 cm. in thickness; extending downwards and backwards about 10 cm. from this swelling, and continuous with it there was a flat firm patch 3·5 cm. wide by about 1 cm. in thickness consisting of dense caseous areas, gritty around the margins and surrounded by translucent fibroid tissue.

Left Prescapular Gland.—The left prescapular gland measured 6 by 3·5 by 2 cm. and showed about three quarters of its substance calcareo-caseous.

Right Prescapular Gland.—The right prescapular gland measured 4·7 by 2 by 1·3 cm. and was normal on section.

Prepectoral Glands.—The spherical gland on the left side was slightly enlarged and contained a calcareous patch 5 mm. in diameter and a calcareous tubercle. Other prepectoral glands were normal.

Cervical and Axillary Glands.—Normal.

Thorax.

Pleura.—Normal.

Lungs.—The lungs were a little fuller than normal, but there were no patches of consolidation; they were moderately closely beset with minute transparent glassy tubercles, which on section of the lung stood up from the cut surface; they were easily removed, were gritty, and when crushed formed a dry white powder; none of them attained a diameter greater than 1 mm.

Thoracic Glands.—The bronchial and mediastinal glands were slightly enlarged and firmer than normal; on section they showed scattered yellow calcareous tubercles, the largest the size of a millet seed, but the majority less than a pin's head.

Heart.—Under the endocardium of the right auricle there was a minute yellowish-white point.

Abdomen.

Omentum and Peritoneum.—Normal.

Spleen.—Normal.

Liver.—Just under the capsule three minute glassy calcareous tubercles were seen; none was seen on section.

Portal Glands.—There were two glassy calcareous tubercles in one portal gland; the rest were normal.

Kidneys.—Both kidneys showed in the cortex a number of yellow atrophic patches; there were no tubercles.

Suprarenal Bodies.—Normal.

Renal, Lumbar and Iliac Glands.—Normal.

Alimentary Tract.

Tongue, Pharynx, Palate, Tonsils; Retropharyngeal, Submaxillary and Parotideal Glands, Intestines.—Normal.

Mesenteric Glands.—All the mesenteric glands were affected, containing sparsely scattered irregular yellow calcareo-caseous tubercles up to a millet seed in size.

Ileo-Colic Glands.—Two contained each two irregular calcareous tubercles.

Various Lymphatic Glands.

Precrural, Popliteal, Gluteal, Ischiatic, Pudic.—Normal.

Microscopical Examination.

Emulsion of Prescapular Gland.—Tubercle bacilli in moderate numbers.

Emulsion of Lung.—No tubercle bacilli seen.

Emulsion of a Bronchial Gland.—No tubercle bacilli seen.

Animals Inoculated.

Guinea-pigs 3038 and 3039 were inoculated intraperitoneally with an emulsion made from the lung. The former died in two days of peritonitis, the latter was killed after 35 days and showed early slight general tuberculosis.

CALF 1439. Virus H. 67. "E.P."

Subcutaneous inoculation of culture derived from the lung of Calf 1329 through Guinea-pig 3039.
Dose—50·0 milligrammes.
Date of Inoculation—August 6, 1908. [Age about five months.]
Killed when in good health—November 9, 1908. [95 days after inoculation.]

Clinical Notes.

The calf remained well during the experiment.

Temperature.

There was a period of slight pyrexia lasting from the 12th to the 20th day after inoculation (maximum 40·5° C.). Otherwise the temperature was normal during the experiment.

Tuberculin Test.

November 4, 1908. [90 days after inoculation.] Dose 2·0 cc. Reacted. Rise of temperature, 1·9° C.

Weights.

	cwt.	qrs.	lbs.
August 6, 1908	1	3	0
November 9, 1908	2	1	18

Total gain of weight.—2 qrs. 18 lbs.

Average rate of gain per week.—5·5 lbs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—In the subcutaneous tissues on the left side of the neck at the seat of inoculation there was a cyst measuring 6 by 5 by 2·5 cm. with fibrous wall and caseo-purulent contents.

Left Prescapular Gland.—The left prescapular gland measured 5 by 2·5 by 1·4 cm., and showed towards one extremity of the cortex a few small calcareous patches composed of calcareous grains.

Right Prescapular Gland.—The right prescapular gland measured 4·8 by 2·2 by 1·4 cm.; its substance was a little oedematous, but otherwise normal.

All the organs and the remaining glands of the body were examined and found healthy.

DOG 23. [Puppy.] Virus H. 67. "E.P."

Intraperitoneal inoculation of an emulsion of the prescapular gland of Calf 1169.
Dose—17,260,000 T.B.
Date—January 24, 1907.
Killed when well—May 15, 1907. [111 days after inoculation.]

POST-MORTEM EXAMINATION.

Body fat and in good condition.

Abdomen.

Omentum and Peritoneum.—On the floor of the abdomen in the mid line there was a fibrous nodule the size of a broad bean, which showed on section small tough opaque white patches, of irregular outline and slightly gritty from calcification. The rest of the parietal peritoneum, the mesentery, mesocolon and omentum were normal.

Pyloric Gland.—The pyloric gland contained two small white foci.

Spleen.—The spleen was not enlarged; on section the Malpighian bodies were conspicuous, but showed no sign of central necrosis; no tubercles were seen.

Liver.—The liver was firm, normal in colour, and showed sparsely scattered throughout the substance grey miliary tubercles with minute opaque centres. There were also a few slightly larger tubercles which were opaque yellowish and distinctly gritty from calcification.

Portal Glands.—Normal.

Kidneys and Suprarenal Bodies.—Appeared normal.

Mesenteric, Colic and Ileo-colic Glands.—Normal.

Intestines.—Normal.

Thorax.

Pleura, Heart and Pericardium.—Normal.

Lungs.—In the left cephalic lobe there was a group of about 20 grey translucent miliary tubercles; otherwise the lungs were normal.

Thoracic Glands.—Normal.

Pharynx and Tonsils.—Normal.

Submaxillary, Pharyngeal, Cervical, Inguinal, Axillary, Lumbar and Iliac Glands.—Normal.

Microscopical Examination.

Peritoneal Nodule.—A few tubercle bacilli.

Tubercle from Liver.—No tubercle bacilli.

VIRUS H. 68. "R.B."

TUBERCULOSIS OF THE SACRUM.

VIRUS H. 68. "R.B."

(May 1, 1906.)

CULTURE INOCULATIONS.

No. I.—November 7, 1906.

The strain was derived from the original material (pus from a sacral abscess), and had been in artificial cultivation a total period of 190 days.

The culture used was the 9th generation, 22 days old, and was grown on glycerin-serum.

FOWLS.

Number.	Method.	Dose.	Duration of Life.	Result.
10	Fed	50·0 mg.	K. 138 days	No tuberculosis.
11	Fed	150·0 mg.	K. 138 ,,	

CALF 1161.

Subcutaneous.

Dose : 100·0 mg.

Killed : Feb. 6, 1907.

91 days.

P.M.—Small local tumour. Two firm caseous nodules in prescapular gland. A prepectoral gland was caseated throughout. Few grey tubercles in lungs. Calcareous tubercles in mesenteric and ileo-colic glands. Minute yellow foci in thoracic glands.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
990	Intrav.	1·0 mg.	D. 43 days	G. T.
991	Intrav.	0·1 mg.	K. 124 ,,	Chronic G. T.
986	Intrap.	10·0 mg.	K. 124 ,,	Chronic G. T.
987	Intrap.	1·0 mg.	K. 124 ,,	Chronic G. T.
988	Subcut.	50·0 mg.	D. 10 ,,	Slight T. Death from other causes.
989	Subcut.	10·0 mg.	K. 124 ,,	Small local lesion and caseation of nearest glands. Slight T. of lungs and one kidney.

GUINEA-PIGS.

—	Number.	Method.	Duration of Life.	Result.
E. of prescapular gland.	2233	Intrap.	K. 302 days	No T.
	2234	Intrap.	K. 108 ,,	G. T.
E. of spleen ...	2232	Intrap.	K. 64 ,,	Healthy.

RABBIT 1158.

Intraperitoneal.

(Emulsion of prescapular gland.)

Killed : 105 days.

Result : Very slight T. of omentum only.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
1985	Intrap.	1·0 mg.	D. 39 days	G. T.
1987	Intrap.	0·1 mg.	D. 40 ,,	G. T.
1986	Subcut.	1·0 mg.	D. 98 ,,	G. T.
1988	Subcut.	0·1 mg.	D. 79 ,,	G. T.

VIRUS H. 68. "R.B."—*continued.*

CULTURE INOCULATIONS—*continued.*

No. I.—November 7, 1906—*continued.*

CALF 1167.

Subcutaneous.
Dose : 50·0 mg.
Killed : Feb. 7, 1907.
92 days.

P.M.—There was a cyst at the seat of inoculation, and in the underlying muscles a small fibro-caseo-calcareous mass was found. The prescapular gland was largely occupied by two calcareo-caseous masses. One or two minute tubercles in lung, one suprarenal, two thoracic, and one lumbar glands.

PIG 75.

Fed at intervals for 19 weeks.
Total amount received : 1500·0 mg.
Killed : May 2, 1907.
176 days.

P.M.—Scattered caseo-calcareous nodules in submaxillary, one cervical, mesenteric, and ileo-colic glands. About 30 small caseo-calcareous nodules in lungs.

GUINEA-PIGS.

—	Number.	Method.	Duration of Life.	Result.
Muscle :	2414	Intrap.	K. 91 days	Chronic G. T.
Spleen:	2415	Intrap.	K. 91 „	Healthy.
Liver :	2416	Subcut.	K. 91 „	Slight chronic G. T.
Lung :	2417	Intrap.	K. 91 „	Chronic G. T.

PIG 77.

Fed at intervals for 19 weeks.
Total amount received : 1500·0 mg.
Killed : Nov. 19, 1907.
377 days.

P.M.—Each tonsil contained two or three pinhead-sized calcareous bodies. The submaxillary and mesenteric glands contained scattered calcareous tubercles up to 1 mm. in diameter ; ten small calcareous tubercles were found in the lungs.

GUINEA-PIGS.

—	Number.	Method.	Duration of Life.	Result.
E. of spleen :	2754	Intrap.	K. 114 days	Healthy.
E. of lung : -	2755	Intrap.	K. 114 „	Chronic G. T.
E. of submaxillary gland :	2756	Intrap.	K. 114 „	Very slight disseminated T.

PIG 79.

Fed once only.
Dose : 50·0 mg.
Killed : May 4, 1907.
178 days.

P.M.—Small caseo-calcareous nodules were fairly numerous in the submaxillary glands, scanty in the mesenteric glands. Several other abdominal glands showed one or two tubercles each. In the lungs were over a dozen small tubercles, some with caseo-calcareous centres.

PIG 81.

Fed once only.
Dose : 50·0 mg.
Killed : Nov. 20, 1907.
378 days.

P.M. — The submaxillary glands were enlarged and extensively replaced by large cheesy gritty nodules ; two cervical glands contained each a similar nodule. The mesenteric glands contained small scattered nodules, the larger softened the smaller calcareous. An occasional tubercle was found in the colic, thoracic, and portal glands ; there were two in the lung and one in the liver.

GUINEA-PIGS.

—	Number.	Method.	Duration of Life.	Result.
E. of submaxillary glands :	2762	Intrap.	D. 108 days	G. T.
	2763	Intrap.	D. 83 „	G. T.

VIRUS H. 68. "R.B."—*continued.*

CULTURE INOCULATIONS—*continued.*

No. II.—NOVEMBER 28, 1906.

The strain was derived from the original material, and had been in cultivation a total period of 211 days.

The culture used was the 10th generation, 22 days old, on glycerin-serum.

FOWLS.

Number.	Method.	Dose.	Duration of Life.	Result.
14	Intrav.	1·0 mg.	K. 90 days	No tuberculosis.
15	Intrav.	10·0 mg.	K. 90 „	
16	Intrav.	50·0 mg.	K. 90 „	Three tubercles in lungs only.

COW 77.

Subcutaneous.
Dose : 100·0 mg.
Killed : May 3, 1907.
156 days.

P.M.—Minimal local lesion ; in the adjacent prescapular gland there was a single small caseo-purulent nodule.

There was no macroscopic evidence of tuberculosis in the udder, but in some creamy matter from a duct two T.B. were found.

Three guinea-pigs inoculated intraperitoneally with emulsions of the spleen, liver, and supramammary gland remained healthy : one inoculated with an emulsion of the prescapular gland became tuberculous (K. 92 days, G.T.).

FEEDING EXPERIMENTS.

No. I.—NOVEMBER 21, 1906.

The strain was derived from the original material, and had been in cultivation a total period of 204 days.

The culture used for feeding was the 10th generation, 15 days old, on glycerin-serum.

GOAT 53.

Fed.
Dose : 50·0 mg.
Killed : Feb. 22, 1907.
93 days.

P.M.—Numerous caseo-calcareous nodules in submaxillary, pharyngeal, and two ileo-colic glands. Few caseous or calcareous tubercles in parotideal, three cervical, gastric and a few mesenteric glands. No tuberculosis elsewhere.

Emulsion of Spleen :
GUINEA-PIG 2267.
Intrap. K. 55 days.
P.M.—T. of omentum only.

II.—DECEMBER 5, 1906.

The strain was derived from the original material, and had been 218 days in cultivation.

The culture used for feeding was the 11th generation on glycerin-serum.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1031	Fed	10·0 mg.	K. 181 days	No. T.
1032	Fed	10·0 mg.	D. 21 „	? slight T. of lungs only.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
2097	Fed	10·0 mg.	D. 97 days	G. T.
2098	Fed	10·0 mg.	D. 151 „	Chronic G. T.
2099	Fed	10·0 mg.	K. 190 „ (when ill).	Chronic G. T.
2100	Fed	10·0 mg.	D. 122 days	Chronic G. T.

VIRUS H. 68. "R.B."—*continued.*

CALF PASSAGE.

CULTURE.

Derived from the original material.
Inoculated on November 7, 1906, after 190 days artificial cultivation, into—

CALF 1167.

Subcutaneous.
Dose : 50·0 mg.
Killed : February 7, 1907.
92 days.

P.M.—Fibrous-walled local tumour with caseous and softened contents ; in the muscles beneath there was a small fibro-calcareo-caseous mass. Caseous and caseo-calcareous masses in prescapular gland. One or two minute tubercles in lung, one suprarenal, two thoracic and one lumbar glands.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
990	Intrav.	1·0 mg.	D. 43 days	G. T.
991	Intrav.	0·1 mg.	K. 124 „	Chronic G. T.
986	Intrap.	10·0 mg.	K. 124 „	Chronic G. T.
987	Intrap	1·0 mg.	K. 124 „	Chronic G. T.
988	Subcut.	50·0 mg.	D. 10 „	Slight T. Death from other causes.
989	Subcut.	10·0 mg.	K. 124 „	Small local lesion and caseation of nearest glands. Slight T. of lungs and one kidney.

Emulsion of prescapular gland into :

GUINEA-PIGS 2245-2247.

Killed : 21 days. Slight T.

FEBRUARY 28, 1907. Emulsion of G.P's. tissues (containing 1,050,000 T.B. per cc.).

CALF 1187.

Subcutaneous.
Dose : 10,500,000 T.B.
Killed : May 30, 1907.
91 days.

P.M. — Fibro-calcareo-caseous local tumour ; left prescapular gland largely composed of similar tissue. In the thoracic glands were fairly numerous small calcareous tubercles ; there were two in the portal glands.

RABBIT 1194.

Subcutaneous.
Dose : 1·0 cc.
Died : 99 days.
P.M.—Local lesion ; slight T. of lungs.

Emulsion of prescapular gland into :

GUINEA-PIGS 2455-2458.

Killed : 21 days. Slight G. T.

JUNE 20, 1907. Emulsion of G.P.'s tissues (T.B. in moderate numbers).

CALF 1251.

Subcutaneous.
Dose : 20·0 cc. of emulsion.
Killed : September 23, 1907.
95 days.

P.M.—At the seat of inoculation there was a firm caseated mass in a fibrous capsule. The left prescapular gland was largely composed of fibro-caseo-calcareous tissue. One prepectoral gland was caseo-calcareous throughout. In the lungs were three small tubercles. In several of the thoracic glands a few minute calcareous foci were seen. Sparsely scattered calcareous tubercles were seen in the mesenteric and ileo-colic glands.

RABBITS.

Number	Method.	Dose.	Duration of Life.	Result.
1339	Subcut.	1·0 cc.	K. 119 days	Local T. and one nodule in the lungs.
1340	Subcut.	1·0 cc.	K. 119 „	Local lesion only.
1341	Intrav.	1·0 cc.	D. 15 „	Early T. of lungs.

continued on page 302.

VIRUS H. 68. "R.B."—*continued.*

CALF PASSAGE—*continued.*

Emulsion of prescapular and prepectoral glands from Calf 1251 (3rd calf) (T.B. in moderate numbers).

CALF 1293.

Subcutaneous.

Dose : 20·0 cc. of emulsion.

Killed : January 17, 1908.

116 days.

P.M.—There was a small fibro-calcareous tumour at the seat of inoculation, and a group of small softened caseous nodules in the left prescapular gland. Two or three minute doubtful grey foci were seen in the lung.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1507	Subcut.	4·0 cc.	K. 206 days	Local lesion and T. of lungs.
1508	Subcut.	4·0 cc.	K. 206 „	Do. do.

Emulsion of prescapular gland into :

GUINEA-PIGS 2889-2891.

Killed : 25 days. Early G. T.

FEBRUARY 11, 1908. Emulsion of G.P.'s tissues (T.B. numerous).

CALF 1361.

Subcutaneous.

Dose : 12·0 cc. of emulsion.

Killed : June 2, 1908.

112 days.

P.M. — Fibro - caseo - calcareous local tumour ; groups of calcareous grains in left prescapular gland ; calcareous patch in left prepectoral gland ; no tuberculosis elsewhere.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1726	Subcut.	1·5 cc.	K. 234 days	Local lesion, T. of lungs and a joint.
1727	Subcut.	1·5 cc.	K. 234 „	Local lesion, slight T. of lungs and kidneys.

CULTURE.

Derived from the prepectoral gland of Calf 1361. Duration of artificial cultivation, 94 days.

The 5th generation of culture, 13 days old, was, on September 4, 1908, inoculated into :

CALF 1463.

Subcutaneous.

Dose : 68·0 mg.

Killed : December 9, 1908.

96 days.

P.M.—There was a softened caseous local tumour and the adjacent prescapular and prepectoral glands were caseous. There were two minute tubercles in the lungs and one in a bronchial gland ; scattered calcareous foci in the mesenteric and ileo-colic glands ; and two caseous tubercles in a popliteal gland.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1990	Subcut.	10·0 mg.	D. 60 days	Local T. and T. of the lungs. ? cause of death.
1991	Subcut.	10·0 mg.	D. 31 „	Local lesion and one tubercle in lung. Death from cellulitis.

CALF 1161. Virus H. 68. "R.B."

Subcutaneous inoculation of culture derived from the original material (pus from sacral abscess).

Dose—100·0 milligrammes.

Date—November 7, 1906.

Weight at Inoculation—1 cwt. 2 qrs. 8 lbs. [Age about 17 weeks.]

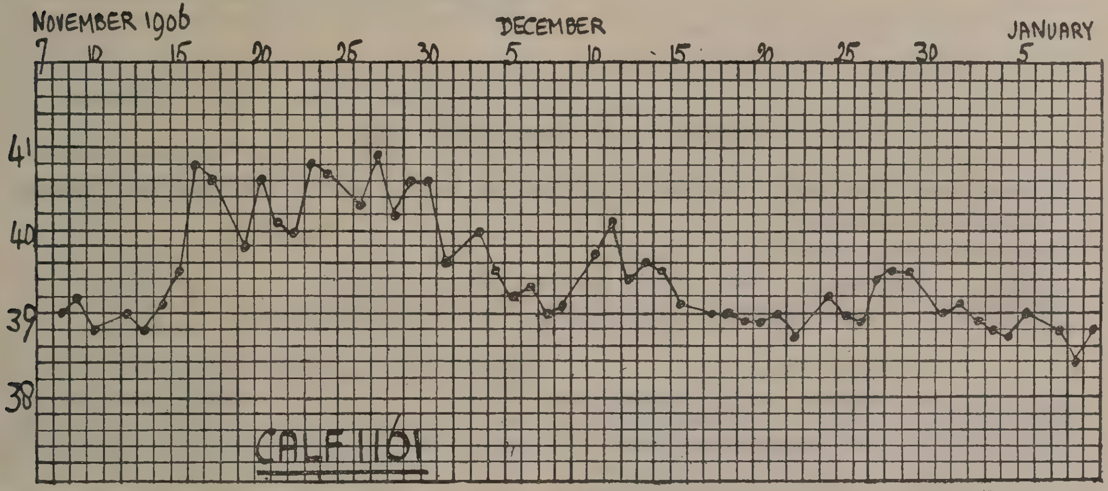
Killed when in good health—February 6, 1907. [91 days after inoculation.]

Clinical Notes.

Five days after inoculation on the left side of the neck a slight local thickening could be felt, and the left prescapular gland was slightly enlarged.

On the thirtieth day there was a small local tumour measuring 7·5 by 5 cm. The gland was a little enlarged, measuring about 6·5 cm. in length. The temperature, which had been high for nearly three weeks, was now falling, and the animal was in good health. It was killed when fat and well on the 91st day after inoculation. No marked change in the local conditions had taken place subsequent to that recorded above.

Temperature.



From January 5, to February 6 when the calf was killed, the temperature remained normal.

Tuberculin Test.—January 31. [85 days after inoculation.] Slight reaction (?). Rise of temperature, 0·5° C.

Weights.

The calf gained weight normally during the experiment :—

	cwt.	qrs.	lbs.
November 7, 1906	1	2	8
February 6, 1907	2	2	0

Total gain of weight.—3 qrs. 20 lbs.

Average rate of gain per week.—8 lbs.

POST-MORTEM EXAMINATION.

General Condition.—Very good.

Local Lesion.—At the seat of inoculation, on the left side of the neck, there was a firm tumour measuring 5 by 5 by 2 cm.; on section it showed in the centre a caseous mass about 2 cm. in diameter, undergoing softening, surrounded by dense fibroid tissue, brownish and translucent internally, white and cicatricial externally; the skin over the tumour was thickened and adherent, and not ulcerated. Extending in the muscles from the under surface of the tumour, about 10 cm. in the direction of the prescapular gland, there was a thick cord a little over 1 cm. in diameter, composed externally of whitish fibrous tissue and internally of brownish translucent fibroid tissue containing calcareous grains and soft caseous foci.

Left Prescapular Gland.—The left prescapular gland measured 6 by 3 by 1·5 cm., and showed on section two firm caseous nodules, each about 1 cm. in diameter; around each was a narrow zone of brownish translucent tissue beset with calcareous grains; the capsule over one of the nodules was thickened, depressed and puckered.

Right Prescapular Gland.—The right prescapular gland measured 6 by 2·5 by 1·5 cm., and on section was a little oedematous and congested (recent tuberculin test).

Prepectoral Glands. — The rounded prepectoral gland on the left side measured 1 cm. in diameter, and was composed partly of dense yellow caseated tissue, slightly gritty from calcification, and partly of brownish translucent fibroid tissue. Other prepectoral glands on this side and those on the right side were normal.

Axillary Glands.—Normal.

Thorax.

Pleura.—Normal.

Lungs.—The lungs were pinkish and crepitant, and had a perfectly normal general appearance; careful search revealed the presence of a few grey tubercles with minute soft occasionally gritty opaque centres, the largest about the size of a millet seed, and a few transparent glassy pin-head sized tubercles, one or two of which were slightly opaque in the centre; scattered about were also minute grey points of a doubtful nature. The latter were seen in greatest number on the thin margins of the caudal lobes.

Thoracic Glands.—The bronchial and mediastinal glands, normal in size, showed on section scattered minute yellow points, irregular in outline, some of which were just perceptibly gritty. These foci could be readily picked out from the gland substance with the point of a scalpel.

Heart.—Normal.

Abdomen.

Omentum and Peritoneum, Spleen, Liver, Portal Glands, Kidneys, Suprarenal Bodies, Renal, Lumbar and Iliac Glands.—Normal.

Alimentary Tract.

Tongue, Pharynx, Palate, and Tonsils.—Normal.

Pharyngeal, Submaxillary, Hyoid, and Parotideal Lymphatic Glands.—Normal.

Intestines.—Normal.

Mesenteric Glands.—The mesenteric glands each contained one or two small irregular yellow calcareous tubercles.

Ileo-colic Glands.—There were similar but rather more numerous foci in the ileo-colic glands.

Colic Glands.—Some of the colic glands contained a few calcareous foci.

Genito-Urinary System.

Testes.—Normal.

Peripheral Lymphatic Glands.

Precrural, Popliteal, Gluteal, Ischiatic, Pudic.—Normal.

Microscopical Examinations.

Emulsion of Prescapular Gland.—Tubercle bacilli.

Emulsion of Prepectoral Gland.—Tubercle bacilli.

Foci from Thoracic Gland.—Tubercle bacilli.

Tubercles from Mesenteric Gland.—A few tubercle bacilli seen.

Tubercle from Lung.—No tubercle bacilli seen.

Animals Inoculated.

Rabbit 1158, inoculated intraperitoneally with emulsion of prescapular gland, was killed after 105 days and showed very slight tuberculosis of omentum only.

Guinea-pigs 2233–2234 were inoculated intraperitoneally with the same emulsion. One killed after 108 days showed general tuberculosis, the other was healthy when killed after 302 days.

Guinea-pig 2232 was inoculated with emulsion of spleen; it was killed 64 days later and found to be perfectly healthy.

CALF 1167. Virus H. 68. "R.B."

Subcutaneous inoculation of culture derived from the original material (pus from sacral abscess).

Dose—50·0 milligrammes.

Date—November 7, 1906.

Weight at Inoculation—1 cwt. 3 qrs. 5 lbs. [Age about 18 weeks.]

Killed when in good health—February 7, 1907. [92 days after inoculation.]

Clinical Notes.

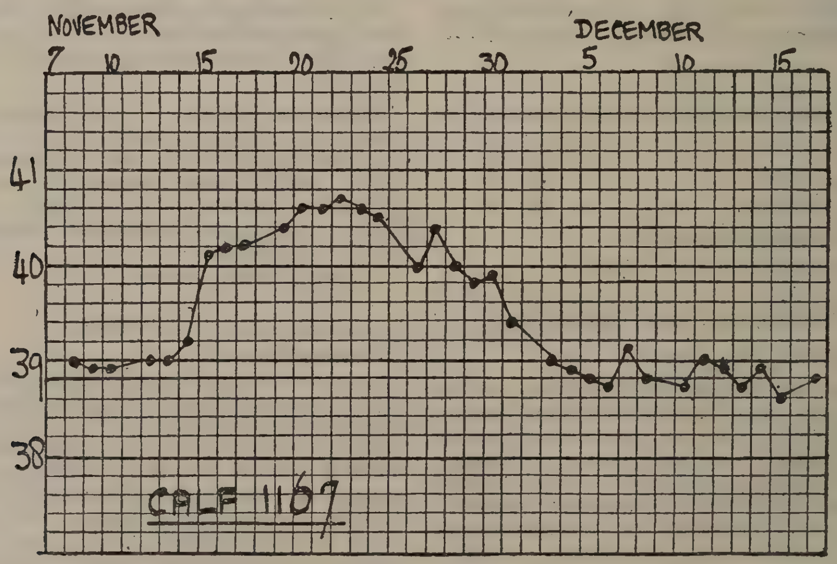
Five days after inoculation on the left side of the neck a slight local thickening could be felt and the left prescapular gland was very slightly enlarged.

On the thirtieth day there was a somewhat pendulous local tumour, softened in the upper part, and measuring 15·2 by 8·3 cm. by about 2·5 cm. in greatest thickness. The prescapular gland was enlarged and hard, and measured 10·25 cm. in length. The temperature, which had been high for over two weeks, was now normal, and the animal was in good health.

The tumour subsequently became semi-fluctuating all over, and the skin at one point appeared to be very thin.

The calf was killed on the 92nd day after inoculation, when fat and well.

Temperature.



From December 17, to February 7 when the calf was killed, the temperature remained normal.

Tuberculin Test.—January 31, 1907. [85 days after inoculation.] Reacted. Rise of temperature 2·1° C.

Weights.

The calf gained weight normally during the experiment.

	cwt.	qrs.	lbs.
November 7, 1906	1	3	5
February 7, 1907	2	2	15

Total gain of weight.—3 qrs. 10 lbs.

Average rate of gain per week.—7·2 lbs.

POST-MORTEM EXAMINATION.

General Condition.—Very good.

Local Lesion.—At the site of the inoculation, on the left side of the neck, there was a rounded semi-fluctuating tumour measuring 11 by 8 by 5 cm.; on section it was composed of caseous substance, partly dense and gritty partly converted into thick caseo-pus, surrounded by a wall of fibrous tissue lined internally with granulation tissue; on washing away the caseo-pus fibrous trabeculae were seen stretching from wall to wall.

The skin over the centre of the tumour was thinned and on the point of breaking down, that over the marginal parts was thickened.

Under the tumour in the deep muscles there was a small fibroid mass beset with irregular calcareo-caseous nodules; arranged around this mass were several discrete calcareo-caseous nodules, up to a pea in size, with translucent fibroid margins; some of these were very deep and lay near the transverse processes of the vertebrae.

Left Prescapular Gland.—The left prescapular gland measured 7·5 by 4 by 3 cm., and was irregular and nodular in outline; on section about $\frac{3}{4}$ of the gland was occupied by a dense pinkish yellow caseous mass, slightly gritty around the margins; the caseous substance was partially separated from the capsule, which was thickened, by a thin layer of caseo-pus; the rest of the gland contained a nodule 2 cm. in diameter, calcareous around the margins, caseous and softened in the centre.

Right Prescapular Gland.—The right prescapular gland measured 6 by 3 by 1·5 cm. and was normal on section.

Prepectoral Glands.—Normal.

Axillary Glands.—Normal.

Thorax.

Pleura.—Normal.

Lungs.—The lungs were crepitant throughout; two transparent pin-head sized tubercles, one with a minute central opacity, were seen in the right caudal lobe under the pleura; with these exceptions the lungs were perfectly normal.

Thoracic Glands.—The long caudal mediastinal gland showed in the cortex two minute yellow gritty foci. The left bronchial gland contained one similar focus. Other thoracic glands were normal.

Heart.—Normal.

Abdomen.

Omentum and Peritoneum, Liver and Spleen, Portal Glands, and Kidneys.—Normal.

Suprarenal Bodies.—One suprarenal contained a doubtful grey tubercle.

Renal, Lumbar, and Iliac Glands.—One lumbar gland contained a minute calcareous focus. The renal and iliac glands were normal.

Alimentary Tract.

Tongue, Pharynx, Palate, and Tonsils.—Normal.

Pharyngeal, Submaxillary, Hyoid, and Parotideal Lymphatic Glands.—Normal.

Intestines and Mesenteric Glands.—Normal.

Genito-Urinary System.

Mammary Gland, Supramammary Lymphatic Glands and Uterus.—Normal.

Various Peripheral Lymphatic Glands.

Precrural, Popliteal, Gluteal, and Ischiatic.—Normal.

Microscopical Examination.

Emulsion of Prescapular Gland.—Tubercle bacilli.

Focus from Thoracic Gland.—No tubercle bacilli seen.

(?) *Tubercle from Suprarenal.*—No tubercle bacilli seen.

Focus from Bronchial Gland.—Two tubercle bacilli seen in a cell.

Animals Inoculated.

With Emulsion of Spleen. — Guinea-pig 2244 (Intrap.). Killed after 63 days. Normal.

With Emulsion of Prescapular Gland.—Guinea-pigs 2245–2247 (Intrap.). Killed after 21 days. Slight tuberculosis.

COW 77. Virus H. 68. "R.B."

Subcutaneous inoculation of culture derived from the original material.

Dose—100·0 milligrammes.

Date—November 28, 1906.

Weight—7 cwt. 3 qrs. 24 lbs.

Killed when in good health—May 3, 1907. [156 days after inoculation.]

ABSTRACT OF POST-MORTEM NOTES.

(For details *see* Report on the Excretion of Tubercle Bacilli in Milk.)

At the seat of inoculation on the left side of the neck there was a thickened patch of skin measuring about 5 cm. in area and 1 cm. in thickness; on transverse section this showed in the centre a small pyramidal patch, with the apex near the surface, of pinkish fibroid tissue containing a soft caseo-purulent focus; there was no sign of tuberculosis in the subcutaneous tissues or in the muscles under the thickened patch.

The left prescapular gland measured 5·5 by 3 by 1·5 cm. and showed at one extremity a yellow caseo-purulent nodule about 1 cm. in diameter, containing gritty foci; the rest of the gland was normal.

The lungs were crepitant throughout and showed no areas of collapse; under the pleura of the right caudal lobe a spherical grey tubercle ? (1·5 mm.) with a soft whitish centre was seen; otherwise the lungs were perfectly healthy.

CALF 1187. Virus H. 68. "R.B."

Subcutaneous inoculation of emulsion of various tuberculous tissues from G.P.'s 2445, 2446, 2447 (infected from Calf 1167).

Dose—10,505,000 T.B. (Vol. 10·0 cc. E=1,050,500 T.B. per cc.)

Date of Inoculation—February 28, 1907. [Age about 17 weeks.]

Killed when in good health—May 30, 1907. [91 days after inoculation.]

Clinical Notes.

A fortnight after the inoculation on the left side of the neck there was a local tumour, flat and slightly raised, measuring 9 by 5·5 cm. The prescapular gland was slightly enlarged, 5 cm. in length.

The local conditions did not alter much subsequently. On May 14, two and a half months after inoculation, the tumour was slightly raised, firm, somewhat nodulated, and measured 8 by 5 cm. The gland was 6 cm. in length.

The calf remained in good health during the experiment.

Temperature.

On the 19th day the temperature rose to 40·2° C. It was slightly raised for 14 days subsequently, then fell to normal, and remained normal until the calf was killed.

Tuberculin Test.—The calf was tested with tuberculin intravenously injected on May 9, 70 days after inoculation; there was a slight reaction, the rise of temperature being 0·7° C.

Weights.

	cwt.	qrs.	lbs.
February 28, 1907	1	2	7
May 30, 1907	2	0	24

Total gain of weight during experiment.—2 qrs. 17 lbs.

Average rate of gain per week.—5·6 lbs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—In the subcutaneous tissues on the left side of the neck there was a flat tumour measuring 6 by 4·5 by 1·2 cm., composed of calcareo-caseous substance intersected by translucent fibroid tissue and completely surrounded by a dense whitish fibrous capsule which was adherent to the muscle aponeurosis on the one hand and the skin on the other; the latter was thickened.

Left Prescapular Gland.—The left prescapular gland measured 5·5 by 3·5 by 1·5 cm., and showed about two-thirds of its substance replaced by fibro-calcareo-caseous masses; the cortical substance between some of the masses contained discrete calcareous tubercles.

Right Prescapular Gland (4·5 by 2·2 by 1 cm.).—Normal.

Prepectoral and Axillary Glands.—Normal.

Thorax.

Thoracic Glands.—The bronchial and mediastinal glands were normal in size and contained fairly numerous discrete yellow calcareous tubercles, ranging in size from a mere point to a millet seed.

Pleura, Lungs, Heart.—Normal.

Abdomen.

Omentum and Peritoneum, Spleen and Liver.—Normal.

Portal Glands.—In the portal glands two minute gritty foci were found.

Kidneys and Suprarenal Bodies, Renal, Lumbar, and Iliac Glands.—Normal.

Alimentary Tract.

Tongue, Pharynx, Palate, Tonsils.—Normal.

Submaxillary, Hyoid, Pharyngeal, and Parotideal Glands, Intestines and Mesenteric Glands.—Normal.

Testes.—Normal.

Various Lymphatic Glands.

Precrural, Popliteal, Gluteal, Ischiatic, Pudic.—Normal.

Microscopical Examination.

Emulsion of Prescapular Gland.—Tubercle bacilli scanty.

Emulsion of Tubercles in a Mediastinal Gland.—Tubercle bacilli scanty.

Animals Inoculated.

Four guinea-pigs, Nos. 2455 to 2458, were inoculated intraperitoneally with an emulsion made from the prescapular gland. These were killed 21 days later and found to have slight general tuberculosis

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CALF 1251. Virus H. 68. "R.B."

Subcutaneous inoculation of an emulsion of various tissues from four guinea-pigs, Nos. 2455–2458 (infected from the prescapular gland of Calf 1187).

Dose—20·0 cc. of emulsion containing T.B. in moderate numbers.

Date of inoculation—June 20, 1907. [Age about 12 weeks.]

Killed when in good health—September 23, 1907. [95 days after inoculation.]

Clinical Notes.

The calf remained in good health during the experiment.

Temperature.—The temperature rose on the 15th day, reached a maximum of 40·5° C. on the 28th day, and remained high until the 33rd day, after which it fell to normal, and continued normal during the remaining period of the experiment.

Tuberculin Test.—The calf was not tested subsequent to inoculation.

Weights.

	cwt.	qrs.	lb.
June 20, 1907	1	0	17
September 23, 1907	1	2	20

Total gain of weight.—2 qrs. 3 lbs.

Average rate of gain per week.—4·3 lbs.

POST-MORTEM EXAMINATION.

Carcase.—In good condition.

Local Lesion.—At the seat of inoculation on the left side of the neck there was a firm swelling measuring 11 by 7 by 4 cm., composed of dense caseated tissue surrounded by a capsule of whitish fibrous tissue, from which it was separated in places by caseo-pus.

In the muscles under the tumour were several large nodules, some caseous and softened, others fibro-calcareo-caseous.

Left Prescapular Gland.—The left prescapular gland measured 6·5 by 4 by 2·5 cm., and showed more than three-quarters of its substance composed of fibro-caseo-calcareous tissue surrounded by a thick capsule of fibrous tissue; the tuberculous tissue showed in places foci of softening.

Right Prescapular Gland (4·3 by 1·7 by 1 cm.).—Normal on section.

Prepectoral Glands.—The rounded gland on the left side was 1·5 cm. in diameter and was caseo-calcareous throughout, the capsule being greatly thickened.

Other prepectoral glands were normal

Cervical Glands.—One in the middle of the neck on the left side contained a fibro-calcareous nodule the size of a split pea.

Axillary Glands.—Normal.

Thorax.

Lungs.—Two miliary tubercles with calcareous centres were seen just beneath the pleura. One minute tubercle was seen on section.

Thoracic Glands.—A few minute calcareous foci were found in some of the bronchial and mediastinal glands.

Pleura and Heart.—Normal.

Abdomen.

Omentum and Peritoneum.—Normal.

Liver and Portal Glands, Spleen, Kidneys and Suprarenal Bodies.—Normal.

Renal Gland.—The renal gland contained a minute yellow gritty focus.

Lumbar and Iliac Glands.—Normal.

Alimentary Tract.

Tongue, Pharynx, Palate, Tonsils.—Normal.

Submaxillary, Retropharyngeal, Parotideal, and Hyoid Glands, Intestines.—Normal.

Mesenteric and Ileo-colic Glands.—The glands at the junction of the ileum and caecum showed sparsely scattered irregular calcareous tubercles, mostly minute but some as large as a millet seed.

The mesenteric glands showed here and there a similar focus.

Testicles.—Normal.

Eyes.—Normal.

Various Lymphatic Glands.

Precrural, Popliteal, Gluteal, Ischiatic, Pudic.—Normal.

Microscopical Examination.

Emulsion of Prepectoral Gland.—Tubercle bacilli in moderate numbers.

Emulsion of Prescapular and Prepectoral Glands.—Tubercle bacilli in moderate numbers.

Emulsion of Bronchial Gland.—No tubercle bacilli seen.

Animals Inoculated.

Calf 1293 was inoculated subcutaneously with 20·0 cc. of emulsion of the prescapular and prepectoral glands.

Rabbits 1507-1508 were inoculated subcutaneously each with 4·0 cc. of the same emulsion. They were killed after 206 days and showed slight tuberculosis.

Guinea-pig 2608 was inoculated intraperitoneally with an emulsion made from the bronchial glands. It was killed after 67 days and showed general tuberculosis.

CALF 1293. Virus H. 68. "R.B."

Subcutaneous inoculation of an emulsion made from the left prescapular and prepectoral glands of Calf 1251.

Dose—20·0 cc. (The emulsion contained tubercle bacilli in moderate numbers.)

Date of Inoculation—September 23, 1907. [Age about 18 weeks.]

Killed when in good health—January 17, 1908. [116 days after inoculation.]

Clinical Notes.

Four weeks after inoculation there was a flat thickening (9 by 7 cm.) at the seat of inoculation on the left side of the neck, and the prescapular gland was a little enlarged, measuring 7 cm. in length. Subsequently the local swelling became slightly more prominent, and more clearly defined; the gland diminished slightly in size.

The calf remained well during the experiment.

Temperature.

Normal throughout.

Tuberculin Tests.

I. October 24, 1907. [31 days after inoculation.] Dose, 2·0 cc. Reacted. Rise of temperature, 1·8° C.

II. October 30, 1907. [37 days after inoculation.] Dose, 2·0 cc. Slight reaction. Rise of temperature, 0·9° C.

Weights.

	cwt.	qrs.	lbs.
September 23, 1907	1	2	6
January 17, 1908	2	2	11

Total gain of weight.—1 cwt. 0 qrs. 5 lbs.

Average rate of gain per week.—7 lbs.

POST-MORTEM EXAMINATION.

The carcass was fat.

Local Lesion.—At the site of inoculation on the left side of the neck there was a flat patch of fibroid tissue about 9 cm. in length; it was thicker in the central part than at the margins (2 cm.) and showed a small cavity, crossed by trabeculae, containing a small quantity of calcareous débris; elsewhere the fibrous tissue was beset with calcareous grains.

Left Prescapular Gland.—The left prescapular gland measured 6 by 2·8 by 1·5 cm. On section the cortex of the lower part of the gland on the convex surface was beset with softened yellow caseous nodules up to a hemp seed in size; the rest of the gland was normal.

Right Prescapular Gland (5 by 2·4 by 1·1 cm.), *Prepectoral and Cervical Glands, Axillary Glands.*—Normal.

Thorax.

Lungs.—Two or three minute doubtful grey foci were seen just under the pleura; the lungs were otherwise normal.

All other organs and glands were examined and found healthy.

Microscopical Examination.

Emulsion of Prescapular Gland. Tubercle bacilli scanty.

Animals Inoculated.

Three guinea-pigs, Nos. 2889–2891, were inoculated intraperitoneally with an emulsion made from the left prescapular gland. One died after 24 days, the others were killed after 25 days; all showed early general tuberculosis.

CALF 1361. Virus H. 68. "R.B."

Subcutaneous inoculation of an emulsion made from the omentum, the spleen and several lymphatic glands of each of three guinea-pigs, Nos. 2889, 2890, 2891, inoculated with the prescapular gland of Calf 1293.

Dose—12·0 cc. of emulsion, in which T.B. were numerous.

Date of Inoculation—February 11, 1908. [Age about 11 weeks.]

Killed when in good health—June 2, 1908. [112 days after inoculation.]

Clinical Notes.

The calf remained well during the experiment.

Temperature.

From the 9th to the 24th days after inoculation the temperature was raised (maximum 40·6° C.). Subsequently it was approximately normal.

Tuberculin Tests.

February 21, 1908. [10 days after inoculation.] Dose, 1·0 cc. Reacted†. Rise of temperature, 0·7° C. †(The temperature was high (40·5° C.) at the time of injection).

May 20, 1908. [99 days after inoculation.] Dose, 2·0 cc. Reacted. Rise of temperature 2·2° C.

Weights.

	cwt.	qrs.	lbs.
February 11, 1908	1	0	8
June 2, 1908	1	2	0

Total gain of weight.—1 qr. 20 lbs.

Average rate of gain per week.—3 lbs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—At the seat of inoculation on the left side of the neck there was a flat firm tumour measuring 7 by 5 by 1·5 cm., composed of dense caseo-calcareous tracts in a scanty matrix of dense fibrous tissue.

Left Prescapular Gland.—The left prescapular gland measured 5·5 by 2 by 1 cm., and showed in the cortex several small groups of calcareous grains.

Right Prescapular Gland.—The right prescapular gland measured 4 by 2 by 1 cm., and was normal on section.

Prepectoral Glands.—The rounded gland on the left side was a little enlarged and about a third of the substance was replaced by a calcareous patch. Other prepectoral glands were normal.

Cervical and Axillary Glands.—Normal.

All the organs and the remaining lymphatic glands were examined and found normal.

Microscopical Examination.

Emulsion of Left Prescapular Gland.—No tubercle bacilli seen.

Emulsion of Left Prepectoral Gland.—Three tubercle bacilli seen.

Animals Inoculated.

Guinea-pigs 3091 and 3092 were inoculated intraperitoneally with an emulsion of the left prescapular gland. The former was killed after 42 days and showed early general tuberculosis, the latter died in 156 days of general tuberculosis.

CALF 1463. Virus H. 68. "R.B."

Subcutaneous inoculation of culture derived from the prepectoral gland of Calf 1361.

Dose—68·0 milligrammes.

Date of Inoculation—September 4, 1908. [Age about 5 months.]

Killed when in good health—December 9, 1908. [96 days after inoculation.]

Clinical Notes.

A tumour of moderate size developed at the seat of inoculation on the left side of the neck and the adjacent glands became enlarged and hard.

The calf remained well during the experiment

Temperature.

On the 10th day after inoculation the temperature rose to 39·4° C. and reached a maximum (40·8° C.) on the 13th day. The pyrexia lasted fourteen days in all; subsequently the temperature remained approximately normal.

Tuberculin Test.

November 4, 1908. [61 days after inoculation.] Dose, 2·0 cc. Reacted. Rise of temperature, 2·4° C.

Weights.

	cwt.	qrs.	lbs.
September 4, 1908	1	3	0
December 9, 1908	2	1	6

Total gain of weight.—2 qrs. 6 lbs.

Average rate of gain per week.—4·5 lbs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—At the seat of inoculation on the left side of the neck there was a rounded tumour measuring 8 by 5 by 4 cm.; on section it was composed of softened caseous substance surrounded by a fibrous capsule 3 to 4 mm. in greatest thickness.

Left Prescapular Gland.—The left prescapular gland measured 6·5 by 4 by 2 cm., and showed more than three-quarters of its substance caseous.

Right Prescapular Gland.—The right prescapular gland measured 5 by 2 by 1 cm., and was normal on section.

Prepectoral Glands.—On the left side one 2 cm. in greatest diameter was caseous throughout and beginning to soften; to this gland was attached a cord which extended between the local lesion and the gland; the cord was nearly as thick as a cedar-wood pencil and was composed of fibroid tissue beset with calcareous foci. Another gland the size of a large pea was caseous almost throughout; a third was normal. The prepectoral glands on the right side were normal.

Cervical Glands.—Normal.

Thorax.

Lungs.—Under the pleura of the right caudal lobe two minute grey tubercles each with an opaque centre were seen, otherwise the lungs were normal.

Thoracic Glands.—The left bronchial gland contained a minute calcareous grain; other thoracic glands were normal.

Heart and Pleura.—Normal.

Abdomen.

Omentum and Peritoneum; Spleen, Liver, Kidneys, and Suprarenal Bodies; Portal, Coeliac, Renal, Lumbar and Iliac Glands.—Normal.

Alimentary Tract.

Tongue, Pharynx, Tonsils; Submaxillary, Retro-Pharyngeal and Parotideal Glands; Intestines.—Normal.

Mesenteric and Ileo-colic Glands.—There were sparsely scattered calcareous foci in the mesenteric glands, two or three to each gland.

There were calcareous foci in the ileo colic glands, rather more numerous than in the mesenteric.

Testicles.—Normal.

Various Lymphatic Glands.

Popliteal.—One popliteal gland contained two small caseous tubercles. The other was normal.

Precrural, Gluteal, Ischiatic, Pudic, Axillary.—Normal.

GOAT 53. Virus H. 68. "R.B."

(Young adult.)

Fed with culture derived from the original material [pus from sacral abscess].

Dose—50·0 milligrammes.

Date—November 21, 1906.

Killed when in good health—February 22, 1907. [93 days after inoculation.]

Clinical Notes.

The goat remained well during the entire period covered by the experiment.

Temperature.—The temperature remained normal during the experiment, the maximum variation being between 38·6 and 39·7° C.

Tuberculin Test.—January 31. [71 days after inoculation.] Reacted. Rise of temperature—1·9° C.

Weights.

	qrs.	lbs.
November 21, 1906	1	27
February 22, 1907	2	10

Total gain of weight.—11 lbs.

POST-MORTEM EXAMINATION.

General Condition.—Good.

Alimentary Tract.

Tongue, Pharynx, Palate, Tonsils.—Normal.

Retropharyngeal Glands.—The retropharyngeal glands were distinctly enlarged. The left was closely beset with friable caseous nodules, slightly gritty from calcification, varying in size up to a pea; in the gland on the right side the nodules were more numerous and had coalesced.

Submaxillary Glands.—The submaxillary glands were slightly enlarged, and contained fairly numerous discrete caseous slightly gritty tubercles ranging in size from a pin's head to a little larger than a millet seed.

Parotid Glands.—Each parotid gland showed a few small gritty yellow tubercles.

Cervical Glands.—At the base of the left ear there was a gland which contained four caseo-calcareous tubercles, the largest the size of a millet seed. The one on the opposite side was normal.

A gland on each side near the mastoid process showed three or four caseo-calcareous tubercles each.

Other cervical glands were normal.

Intestines.—Normal.

Gastric Glands.—Four small glands near the cardiac end of the oesophagus contained each a few irregular caseo-calcareous tubercles, up to a millet seed in size; another on the cardiac end of the stomach along the attachment of the omentum contained a few discrete calcareous foci.

Mesenteric Glands.—Four calcareous tubercles ranging in size from a pin's head to that of a millet seed were found.

Ileo-colic Glands.—Two, not apparently enlarged, contained each a moderate number of irregular opaque caseo-calcareous nodules, ranging in size from a pin's head to a hemp seed; in one of the glands several of the nodules had coalesced forming a caseo-calcareous patch about 8 mm. in diameter.

Colic Glands.—Normal.

Thorax.

Pleura, Lungs, Thoracic Glands, Heart.—Normal.

Abdomen.

Spleen, Liver and Portal Glands, Kidneys and Suprarenals, Renal, Lumbar, and Iliac Glands.—Normal.

Various Lymphatic Glands.

Prescapular and Axillary, Precrural and Popliteal, Gluteal and Ischiatic.—Normal.

Microscopical Examination.

Tubercle from Ileo-colic Gland.—A few tubercle bacilli seen.

Tubercle from Pharyngeal Gland.—Three tubercle bacilli seen.

Animals Inoculated.

Guinea-pig 2267 was inoculated intraperitoneally with an emulsion made from the spleen, and was found to have slight tuberculosis when killed 55 days later.

PIG 75. Virus H. 68. "R.B."

Fed weekly for 19 weeks with culture derived from the original material. The amount of culture given weekly varied from 33·0 mg. to 142·0 mg., and the total quantity received was 1·5 grammes (1500·0 milligrammes).

The experiment commenced on November 7, 1906.

Age of Pig—7 weeks.

Killed when in good health—May 2, 1907. [176 days after commencement of experiment.]

Clinical Notes.

The pig remained in good health during the experiment, grew rapidly, and became fat.

Temperature.—Not recorded.

Tuberculin Test.—January 31, 1907. [85 days after inoculation.] Rise of temperature, 1·6° C.

Weights.

	cwt.	qrs.	lbs.
November 7, 1906	0	0	21
May 2, 1907	1	0	26

Total gain of weight.—1 cwt. 5 lbs.

POST-MORTEM EXAMINATION.

Body fat and in good condition.

Alimentary Tract.

Tongue, Pharynx, and Tonsils.—Normal.

Submaxillary Glands.—The right submaxillary gland, not obviously enlarged, contained one caseo-calcareous nodule with a mulberry-like outline about 1 cm. in diameter, and several smaller ones the largest the size of a hemp seed; the nodules readily shelled out from thin fibrous capsules. There were similar but rather more numerous nodules in the submaxillary gland on the left side; these varied in size from a millet seed to a large pea.

Cervical Glands.—On the right side one near the articulation of the jaw contained an irregular caseo-calcareous nodule, 1 cm. in diameter. Other cervical glands were normal.

Intestines.—Normal.

Mesenteric Glands.—The mesenteric glands were not enlarged and showed on section scattered discrete caseo-calcareous nodules ranging in size from a millet seed to a little larger than a hemp seed; here and there was a larger mass, where several nodules had coalesced; the nodules were most numerous and largest in the glands in the posterior part of the mesentery; in those in the anterior part they were small and sparsely distributed. The tissue of all the glands appeared firmer than normal, and showed an increase of interstitial connective tissue.

Ileo-colic and Colic Glands.—The ileo-colic glands were not enlarged; one contained about a dozen discrete caseo-calcareous nodules, varying in size from a pin's head to a hemp seed; other glands in this group were normal.

One colic gland contained a caseo-calcareous tubercle the size of a millet seed, another a similar tubercle the size of a pin's head.

Abdomen.

Omentum, Peritoneum, Spleen, Liver.—Normal.

Portal Glands.—One portal gland contained a calcareous focus. A gland on the pancreas showed a minute whitish point.

Kidneys and Suprarenals.—Normal.

Renal, Lumbar, and Iliac Glands.—Normal.

Thorax.

Pleura—Normal.

Lungs.—The lungs were crepitant throughout and collapsed normally; they contained, evenly distributed throughout both lungs, sparsely scattered grey nodules with caseo-calcareous centres, ranging in size from 1 to 5 mm. in diameter (majority about 1·5 mm.); there were altogether about 30 nodules in the lungs.

Bronchial and Mediastinal Glands.—Normal.

Heart.—Normal.

Various Lymphatic Glands.

Prescapular, Precrural, Popliteal, and Superficial Inguinal.—Normal.

Microscopical Examination.

Emulsion of Caseous Material from Submaxillary Gland.—Tubercle bacilli scanty.

Tubercle from Colic Gland.—No tubercle bacilli seen.

Animals inoculated with emulsions made from various tissues :—

Emulsion of muscle. G.P. 2414. Intraperitoneal.
Emulsion of spleen. G.P. 2415. Intraperitoneal.
Emulsion of liver. G.P. 2416. Subcutaneous.
Emulsion of lung. G.P. 2417. Intraperitoneal.

All were killed 91 days later. No. 2415 was healthy; the others were tuberculous.

PIG 77. Virus H. 68. "R.B."

Fed weekly for 19 weeks with culture derived from the original material. The amount of culture given weekly varied from 25·0 mg. to 142·0 mg. and the total quantity received was 1·5 grammes (1500·0 milligrammes).

The experiment commenced on November 7, 1906.

Age of Pig—7 weeks.

Killed when in good health—November 19, 1907. [377 days after commencement of experiment.]

Clinical Notes.

The pig remained in good health during the experiment, grew rapidly and became very fat.

Tuberculin Test.

January 31, 1907. [85 days after commencement of experiment.] Reacted. Rise of temperature, 1·6° C.

Weights.

	cwt.	qrs.	lbs.
November 7, 1906	0	0	25
November 19, 1907	2	0	18

Total gain of weight.—1 cwt. 3 qrs. 21 lbs.

POST-MORTEM EXAMINATION.

General condition.—Very fat.

Alimentary Tract.

Tongue, Pharynx, Palate.—Normal.

Tonsils.—In the substance of each tonsil two or three highly calcareous bodies the largest the size of a pin's head were found.

Submaxillary Glands.—The submaxillary glands were not enlarged, each contained scattered irregular calcareous tubercles the largest the size of a pin's head, here and there grouped together.

Other Glands in the Neck were normal.

Intestines.—Normal.

Mesenteric Glands.—The mesenteric glands were normal in size. Several about the middle and towards the posterior extremity of the mesentery contained a number of discrete calcareous tubercles the largest 1 mm. in diameter.

The glands in the anterior part of the mesentery were normal. The rest were normal or contained from one to three or four small calcareous tubercles. Many of the tubercles were situated just under the capsule and all were readily shelled out from the gland substance.

Ileo-colic and Colic Glands.—Normal.

Thorax.

Lungs.—Under the pleura of the right lung there were six, and under that of the left three calcareous tubercles varying in size from less than 0·5 mm. to about 1 mm. in diameter; each had a narrow fibrous margin or capsule from which the calcareous centre was readily shelled. On section one miliary calcareous tubercle was found in the depth of the right lung.

Bronchial and Mediastinal Glands, Heart, Pleura.—Normal.

Abdomen.

Omentum and Peritoneum, Liver and Portal Glands, Spleen, Kidneys and Suprarenal Bodies.—Normal.

Testicles.—Normal.

Various Lymphatic Glands.

Prescapular, Precrural, Popliteal, Pudic, Lumbar and Iliac.—Normal.

Microscopical Examination.

Calcareous Focus from Tonsil.—No tubercle bacilli.

Emulsion of Submaxillary Gland.—No tubercle bacilli.

Tubercle from Lung.—No tubercle bacilli.

Animals Inoculated.

Guinea-pigs 2756 and 2757 were inoculated intraperitoneally with an emulsion made from the submaxillary glands, Guinea-pig 2754 intraperitoneally with an emulsion of the spleen, and Guinea-pig 2755 intraperitoneally with an emulsion of the lung. No. 2757 died in three days of a subacute infection; No. 2754 was killed after 114 days and found healthy; Nos. 2755 and 2756 were killed after 114 days and showed, one chronic general tuberculosis, the other slight disseminated tuberculosis.

PIG 79. Virus H. 68. "R.B."

Fed once only with culture derived from the original material.

Dose—50·0 milligrammes.

Date of Feeding—November 7, 1906. [Age 7 weeks.]

Killed when in good health—May 4, 1907. [178 days after feeding.]

Clinical Notes.

The pig remained in good health during the experiment, grew rapidly, and became fat.

Tuberculin Test.—January 31, 1907. [85 days after inoculation.] Reacted. Rise of temperature, 1·2° C.

Weights.

	cwt.	qrs.	lbs.
November 7, 1906	0	0	24
May 4, 1907	1	0	11

Total gain of weight.—3 qrs. 15 lbs.

POST-MORTEM EXAMINATION.

Body in good condition and fat.

Alimentary Tract.

Tongue, Pharynx, Tonsils.—Normal.

Submaxillary Glands.—The submaxillary glands were not obviously enlarged; on section they showed each about half-a-dozen caseo-calcareous nodules, which readily shelled out, ranging in size from 5 to 10 mm. in diameter.

Retropharyngeal Glands.—The one on the right side contained a pea-sized caseo-calcareous nodule.

Cervical Glands.—Normal.

Gastric Glands.—Normal.

Intestines.—Normal.

Mesenteric Glands.—The mesenteric glands were normal in size and showed on section altogether about ten irregular caseo-calcareous nodules which readily shelled out, the largest 5 mm. in greatest diameter, and a few minute whitish points.

Ileo-colic Glands.—Two showed on section a few discrete calcareo-caseous tubercles.

Colic Glands.—In one there was an irregular calcareo-caseous tubercle the size of a millet seed; the rest were normal.

Abdomen.

Omentum and Peritoneum.—Normal.

Liver and Spleen.—Normal.

Portal Glands.—Two contained each one calcareous tubercle the size of a rape seed.

Kidneys and Suprarenal Bodies.—Normal.

Coeliac Glands, Renal, Lumbar, and Iliac Glands.—Normal.

Thorax.

Pleura.—Normal.

Lungs.—The lungs were perfectly normal in general appearance; they contained sparsely scattered throughout the parenchyma grey tubercles varying in size from 1 to 2 mm. in diameter; six were counted on the surface of each lung and there were a few in the depth; the larger ones had caseo-calcareous centres, several of the smaller ones were homogeneous throughout.

Bronchial and Mediastinal Glands.—Normal.

Heart.—Normal.

Various Lymphatic Glands.

Prescapular, Popliteal, Superficial Inguinal, Precrural.—Normal.

Microscopical Examination.

Nodule from Mesenteric Gland.—Three tubercle bacilli seen.

Tubercle from Portal Gland.—No tubercle bacilli seen.

PIG 81. Virus H. 68. "R.B."

Fed once only with culture derived from the original material.

Dose—50·0 milligrammes.

Date of Feeding—November 7, 1906. [Age 7 weeks.]

Killed when in good health—November 20, 1907. [378 days after feeding.]

Clinical Notes.

The pig remained well, grew rapidly, and became very fat.

Tuberculin Test.

January 31, 1907. [85 days after inoculation.] Reacted. Rise of temperature, 1·2°C.

Weights.

		cwt.	qrs.	lbs.
November 7, 1906	... ...	0	0	23
November 20, 1907	... ...	2	2	2

Total gain of weight.—2 cwt. 1 qr. 7 lbs.

POST-MORTEM EXAMINATION.

The carcass was fat.

Alimentary Tract.

Tongue, Pharynx, Tonsils.—Normal.

Submaxillary Glands.—The gland on each side was enlarged (about twice the normal) and nodular; on section the substance was extensively replaced by cheesy, gritty, caseous nodules, ranging in size from 0·5 to 1·5 cm. in greatest diameter; each nodule had a thin fibrous capsule.

Cervical Glands.—On the left side, one near the angle of the jaw contained a hempseed-sized caseous and softened nodule with a thin fibrous capsule.

A gland near the articulation of the jaw on the right side contained a caseous pultaceous slightly gritty mass 1 cm. in diameter.

Other glands in the throat and neck were normal.

Stomach and Intestines.—Normal.

Mesenteric Glands.—The mesenteric glands were not enlarged; many were normal, but the majority contained discrete nodules, from one to about half a dozen, varying in size from a pin's head to that of a hempseed; the smaller nodules were calcareous, the larger ones caseous softened and only slightly gritty. The affected glands were distributed at fairly regular intervals in the mesentery.

Colic Glands.—Three minute calcareous foci were found in two of the colic glands.

Thorax.

Lungs.—The lungs were perfectly normal in general appearance; in each caudal lobe an irregular calcareous tubercle was seen just under the pleura; no tubercles were found on section.

Thoracic Glands.—One bronchial gland contained a minute calcareous grain; the rest were normal.

A gland below the trachea in front of the heart contained a millet-seed sized caseous tubercle.

The dorsal mediastinal glands were normal.

Heart and Pleura.—Normal.

Abdomen.

Omentum and Peritoneum; Spleen, Kidneys and Suprarenal Bodies.—Normal.

Liver.—In the substance of the liver a nodule, a little larger than a millet seed, with a fibrous margin and granular calcareous centre was found.

Portal Glands.—Two contained each a minute caseous focus.

Testicles.—Normal.

Various Lymphatic Glands.

Prescapular, Precrural, Popliteal, Pudic, Lumbar and Iliac.—Normal.

Microscopical Examination.

Emulsion of Submaxillary Gland. — Tubercle bacilli scanty.

Nodule from Liver.—No tubercle bacilli.

Guinea-pigs Inoculated.

Two guinea-pigs, 2762 and 2763, were intraperitoneally inoculated with an emulsion made from a submaxillary gland. They died of general tuberculosis in 108 and 83 days respectively.

VIRUS H. 69. "F.K."

PRIMARY ABDOMINAL TUBERCULOSIS.

VIRUS H. 69. "F.K."

PRIMARY ABDOMINAL TUBERCULOSIS.

(May 17, 1906.)

CULTURE INOCULATIONS.

MENINGES, NOVEMBER 29, 1906.

The strain was derived from the original material, through G.P. 1924, and had been in artificial cultivation a total period of 153 days.

The culture used was the 8th generation, 20 days old.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1021	Intrav.	1·0 mg.	D. 6 days	Early T. of lungs.
1020	Intrav.	0·1 mg.	D. 16 „	G. T.
1023	Intrap.	1·0 mg.	D. 19 „	G. T.
1022	Intrap.	0·1 mg.	D. 22 „	G. T.
1025	Subcut.	10·0 mg.	D. 25 „	G. T.
1024	Subcut.	1·0 mg.	D. 63 „	G. T.

CATS.

Number.	Method.	Dose.	Duration of Life.	Result.
11	Intrap.	1·0 mg.	D. 17 days	Acute T.
13	Subcut.	1·0 mg.	K. 36 days (when ill).	Acute G. T.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
2036	Intrap.	1·0 mg.	D. 10 days	Acute T.
2035	Intrap.	0·1 mg.	D. 18 „	G. T.
2038	Subcut.	1·0 mg.	D. 57 „	G. T.
2037	Subcut.	0·1 mg.	D. 54 „	G. T.

VIRUS H. 69. "F.K."—*continued.*

CULTURE INOCULATIONS—*continued.*

MENINGES, JULY 23, 1907.

The strain was derived from the same source, and had been in cultivation a total period of 389 days.

The culture used was the 15th generation, 21 days old.

CALF 1267.
Subcutaneous.
Dose: 50·0 mg.
Killed when dying:
Sept. 17, 1907. 56 days.
P.M.—General Tuberculosis, severe.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1394	Subcut.	50·0 mg.	D. 31 days	G. T.
1395	Subcut.	10·0 mg.	D. 54 „	G. T.

MESENTERIC GLANDS, JANUARY 9, 1907.

The strain was derived from the original material, through G.P. 1962, and had been in artificial cultivation a total period of 64 days.

The culture used was the 5th generation, 22 days old.

RABBITS.

umber.	Method.	Dose.	Duration of Life.	Result.
1087	Intrav.	1·0 mg.	D. 17 days	G. T.
1088	Intrav.	0·1 mg.	D. 4 „	Cause of death not determined.
1089	Intrap.	1·0 mg.	D. 19 „	G. T.
1090	Intrap.	0·1 mg.	D. 49 „	G. T.
1091	Subcut.	10·0 mg.	D. 81 „	G. T.
1092	Subcut.	1·0 mg.	D. 92 „	G. T.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
2165	Intrap.	1·0 mg.	D. 19 days	G. T.
2167	Intrap.	0·1 mg.	D. 23 „	G. T.
2166	Subcut.	1·0 mg.	D. 45 „	G. T.
2168	Subcut.	0·1 mg.	D. 59 „	G. T.

MESENTERIC GLANDS, JULY 23, 1907.

The strain was derived from the same source, and had been in cultivation a total period of 259 days.

The culture used was the 11th generation, 21 days old.

CALF 1249.
Subcutaneous.
Dose: 50·0 mg.
Killed: November 1, 1907.
101 days.
P.M.—General progressive tuberculosis of moderate severity.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1392	Subcut.	10·0 mg.	D. 46 days	G. T.
1393	Subcut.	10·0 mg.	D. 55 „	G. T.

CALF 1267. Virus H. 69. "F.K."

Subcutaneous inoculation of culture derived from the meninges, through Guinea-pig 1924.

Dose—50·0 milligrammes.

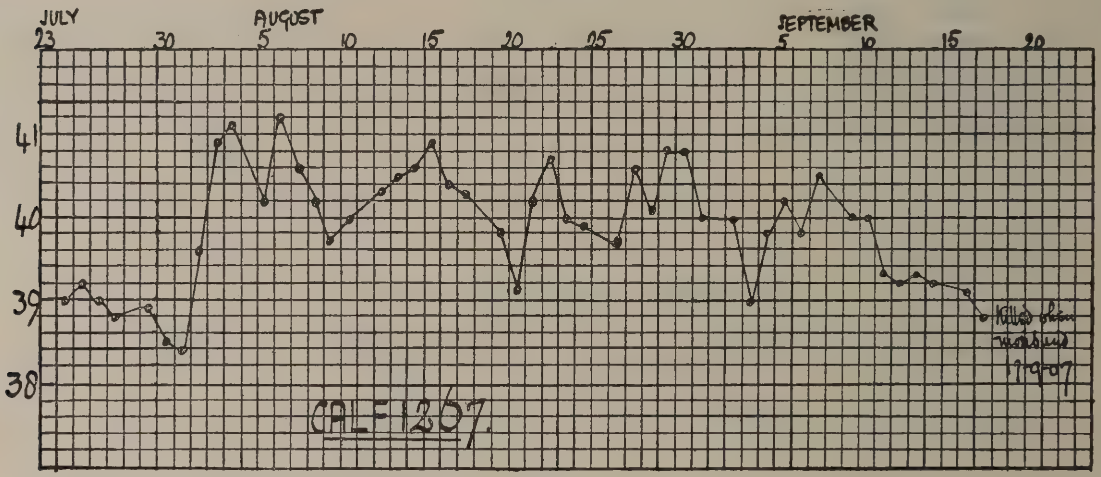
Date of Inoculation—July 23, 1907. [Age about 17 weeks.]

Killed when moribund—September 17, 1907. [56 days after inoculation.]

Clinical Notes.

The course of the disease was similar to that usually seen in calves inoculated subcutaneously with 50·0 mg. of a virulent virus.

Temperature.



Tuberculin Test.—The calf was not tested subsequent to inoculation.

Weights.

	cwt.	qrs.	lbs.
July 23, 1907	1	1	17
September 17, 1907	1	0	6

Total loss of weight during experiment.—1 qr. 11 lbs.

Average rate of loss per week.—6 lbs.

POST-MORTEM EXAMINATION.

Carcass.—Very emaciated.

Local Lesion.—At the seat of inoculation on the left side of the neck there was a very large firm tumour very adherent to the deep structures of the neck and to the nearest glands; it weighed with infiltrated skin and muscles 2 lbs. 10 ozs. and measured 19 by 12·5 by 7·5 cm.

On section it was composed of three layers; an outer one of skin, caseous throughout its whole thickness and in many places soft and necrotic, the superficial epidermis, covered with dried and fissured discharge, being readily peeled off from nearly the whole surface of the tumour; a middle one of homogeneous juicy pinkish caseo-necrotic substance 2·5 cm. thick, and an internal one of dense fibroid tissue closely beset with yellow caseous nodules and masses.

The tissues around the lower part of the tumour were very oedematous and the muscles between it and the glands were thickened infiltrated and caseating.

Left Prescapular Gland.—The left prescapular gland weighed 12 ozs. and measured 12·5 by 6·5 by 6·5 cm. On section it was composed practically throughout of dense pinkish yellow caseo-necrotic substance showing here and there opaque foci of beginning calcification; in the centre of the gland there was a patch of fibrous tissue beset with caseous tubercles; the capsule of the gland was much thickened.

Prepectoral Glands.—On the left side there were four, the largest the size of a walnut; one was caseous almost throughout, the others were indurated and closely beset with caseous tubercles.

On the right side one contained minute caseous tubercles; another was normal.

Right Prescapular Gland.—The right prescapular gland was enlarged measuring 8 by 4 by 1·5 cm.; on section it was very oedematous and showed at one extremity an early caseating patch, a few large caseating nodules and numerous minute caseous tubercles.

Cervical Glands.—On the left side one in the middle of the neck and another at the angle of the jaw were much enlarged very dense and caseous practically throughout, resembling the prescapular gland; other glands on this side were enlarged indurated and beset with small caseous tubercles.

On the right side the glands were slightly oedematous; some were free from tubercles, others showed numerous minute greyish-white tubercles.

Thorax.

Pleura.—On the costal pleura on the right side were four prominent loosely attached caseating growths, the largest 1 cm. in diameter.

The rest of the pleura was normal.

Lungs.—The lungs were closely beset with caseating nodules varying much in size, the largest perhaps as large as a large pea, the smallest the size of a pin's head; many of those just under the pleura projected slightly and were flattened out; there were besides throughout both lungs many dense caseous masses occupying the whole or parts of a lobule. There were no large areas of consolidation, but very numerous small irregular red patches of hepatization, giving the surfaces of the lung a mottled appearance. These hepatized patches were seen also on section.

Thoracic Glands.—Just within the entrance to the thorax on the left side there was a large gland 4 cm. in greatest diameter which was dense and caseating throughout, the caseous areas being separated by a network of translucent fibroid tissue. The corresponding gland on the opposite side contained discrete caseous tubercles.

The dorsal mediastinal and bronchial glands together weighed 12·5 ozs.; the long mediastinal gland measured 14 by 5 by 3·5 cm. and weighed 6 ozs.; they were very indurated, and on section composed of translucent congested fibroid tissue closely infiltrated with a yellow caseous network and showing also irregular caseous patches.

The interbronchial glands were very large and resembled the mediastinal.

Heart.—On the endocardium of the right auricle there were a few minute pearly tubercles. The heart muscle and the valves were normal. The pericardium was normal.

Abdomen.

Omentum.—On the ventral surface were several large caseous nodules, lenticular in outline and deeply congested around the periphery, the largest 7 mm. in diameter; there were besides numerous small grey translucent tubercles.

Peritoneum.—On the peritoneal surface of the diaphragm there was a group of caseating growths and a few single nodules.

Spleen.—The spleen weighed 11 ozs. There was one lenticular caseating nodule on the surface, 8 mm. in diameter. The pulp was closely beset with firm yellow caseous nodules with very narrow grey margins, the largest 5 mm. in diameter, some beginning to break down in the centre.

Liver.—On the surface of the liver there was a small number of slightly raised flattened caseating nodules with undermined margins, and under the capsule fairly numerous smaller nodules, some projecting slightly from the surface. On section of the liver moderately numerous evenly distributed yellow caseous nodules were seen; they ranged in size from 1 to 5 mm., but the majority varied from 1 to 2 mm., some of the larger ones having minute calcareous centres.

Portal Glands.—The portal glands were much enlarged and their cortices composed of firm nodular caseating masses (yellow caseous areas surrounded by a matrix of translucent fibroid tissue).

Kidneys.—Each kidney showed in the cortex about 15 caseous tubercles, the largest rather larger than a millet seed (except one which was almost the size of a pea), and extremely numerous minute grey foci.

Suprarenal Bodies.—Each showed in the cortex one greyish-yellow miliary tubercle.

Alimentary Tract.

Pharynx.—In the corrugated mucous membrane of the vault of the pharynx there were two small caseous nodules.

Tonsils.—The left contained one softened caseous nodule. The right was normal.

Tongue.—Normal.

Intestines.—In the small intestine two Peyer's patches each contained a small group of caseous tubercles.

In the submucous tissue of the caecum there were three caseous tubercles the mucous membrane over which was ulcerated.

There was one ulcerated caseous tubercle in the colon.

Mesenteric Glands.—The mesenteric glands contained a varying number of firm caseating nodules, the largest about 5 mm. in diameter.

Ileo-colic and Gastric Glands.—The ileo-colic and some of the gastric glands were more severely affected, large patches of the cortex being replaced by caseating masses.

Mammary Gland.—Normal.

Eyes.—In the ciliary processes of the right eye there was a minute greyish-white tubercle. The left was normal.

Larynx and Trachea.—Normal.

Various Lymphatic Glands.

Precrural, Popliteal, Pudic, Right Axillary, Lumbar, Iliac and Ventral Mediastinal Glands.—These contained a varying number of firm caseating nodules, the largest 5 mm. in diameter.

Submaxillary, Parotideal, and Retropharyngeal Glands.—These contained similar nodules, but rather more numerous and in places confluent.

Left Axillary.—This gland was enlarged and oedematous, the cortex being infiltrated with minute caseous tubercles.

Gluteal and Ischiatic Glands.—The left gluteal contained one nodule, the left ischiatic several. The right gluteal and ischiatic were normal.

Renal Gland.—The renal gland was enlarged and closely beset with caseating nodules.

Coeliac Glands.—These were enlarged, indurated, and caseating throughout, resembling the mediastinal.

Microscopical Examination.

Tubercle from Ciliary Processes.—A few tubercle bacilli were seen.

CALF 1249. Virus H. 69. "F.K."

Subcutaneous inoculation of culture derived from the human mesenteric glands through G.P. 1962.

Dose—50·0 milligrammes.

Date of Inoculation—July 23, 1907. [Age about 13 weeks.]

Killed when well—November 1, 1907. [101 days after inoculation.]

Clinical Notes.

Thirty-five days after the inoculation on the left side of the neck there was a rather small firm flat local swelling, and the left prescapular gland was very large and hard. The calf appeared well.

On the 87th day there was a firm well-defined tumour measuring 10 by 9 cm., flattened on the surface. The prescapular gland was uniformly enlarged, measuring 9 cm. in longest diameter; a left prepectoral gland was the size of a walnut.

The calf showed no definite signs of ill health during the experiment; there was no increase of respiration and no emaciation, but the rate of growth was below the normal, and the appetite was capricious.

Temperature.

On the 10th day after inoculation the temperature rose to 40·5° C. Subsequently there was irregular pyrexia [until the calf was killed three months later], the temperature being usually between 39·0 and 40·0° C; the maximum range of variation during this period was 1·9° C. (38·5–40·4° C.).

Tuberculin Tests.

No. I.—October 24, 1907. [93 days after inoculation.] Reacted. Rise of temperature, 1·3° C.

No. II.—October 30, 1907. [99 days after inoculation.] No reaction. Rise of temperature, 0·2° C.

Weights.

	cwt.	qrs	lbs.
July 23, 1907	1	0	24
November 1, 1907	1	2	9

Total gain of weight.—1 qr. 13 lbs.

Average rate of gain per week.—2·8 lbs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—On the left side of the neck there was a firm projecting well defined tumour measuring 10 by 10 by 4 cm., which on section was composed of dense caseated tissue, gritty from calcification, infiltrating both skin and muscles.

Left Prescapular Gland.—The left prescapular gland weighed 4 ozs. and measured 8 by 4·5 by 4·3 cm.; it was composed throughout of very dense yellow caseated tissue, gritty from calcification; the capsule was thickened.

Right Prescapular Gland.—The right prescapular gland measured 5·7 by 2·5 by 1·2 cm.; the substance was oedematous and contained scattered caseo-calcareous tubercles.

Prepectoral Glands.—On the left side one, 2·5 cm. in greatest diameter, was caseous throughout; another showed a caseo-calcareous patch at one extremity; a third contained a single tubercle.

On the right side one contained a caseo-calcareous tubercle; another was normal.

Cervical Glands.—Some of the cervical glands contained a few discrete caseo-calcareous tubercles; others were normal.

Thorax.

Pleura.—On the parietal pleura there was fairly numerous nodules, similar to those on the omentum, but on the whole smaller; anteriorly they were more or less discrete, but posteriorly they were in several places arranged in clusters in hypertrophied lymphatic fringes.

On the pleural surface of the diaphragm there were several fibro-caseo-calcareous nodules, some pinkish fleshy outgrowths and squamous warty vegetations.

Lungs.—The lungs were pinkish and crepitant throughout and collapsed normally; they showed on the surface moderately numerous mushroomed nodules similar to those on the pleura and peritoneum; the parenchyma of the lung contained fairly numerous evenly distributed yellow calcareous tubercles with grey margins ranging in size up to that of a millet seed.

Thoracic Glands.—The bronchial and dorsal mediastinal glands were moderately enlarged and showed on section irregular calcareo-caseous patches and discrete calcareous tubercles.

Heart and Pericardium.—On the pericardium at the root of the aorta there were some warty tuberculous vegetations.

In the muscle of the left ventricle there was an oval caseous nodule 8 mm. in greatest diameter.

The endocardium was normal.

Abdomen.

Omentum.—On the ventral surface of the omentum there was a considerable number of somewhat flattened and irregular nodules, ranging up to 1 cm. in diameter, some loosely attached by a fibrous pedicle; on section the nodules were composed of fibrous tissue containing caseo-calcareous patches and foci.

Peritoneum.—The peritoneal surface of the diaphragm on the right side was closely covered with raised flattened fibro-caseo-calcareous nodules similar to those on the omentum; on the left side there were three or four nodules, one attached by a long pedicle and hæmorrhagic.

There were a few similar tubercles on the peritoneum covering the abdominal wall on the floor and on the left side.

Spleen.—The surface of the spleen was studded with slightly raised flattened nodules some of which appeared to be growing from the capsule, others from the pulp; on section the pulp was closely packed with caseo-calcareous nodules ranging in size up to that of a hempseed.

Liver.—On the surface of the liver there were fairly numerous raised nodules similar to those on the omentum and in the substance under the capsule many small tubercles could be seen; on section moderately numerous small tubercles, varying up to a millet seed, were evenly distributed throughout; these tubercles had yellow gritty centres and fibrous margins.

Portal Glands.—The portal glands were slightly enlarged and were beset with discrete irregular yellow caseo-calcareous nodules up to a hempseed in size.

Gall-bladder.—Normal.

Kidneys.—Both kidneys were much enlarged, the right weighing 1 lb., the left 12 ozs.; many of the lobules were pale dense and fibroid, and those that had preserved some of the normal kidney colour showed an increase in interstitial connective tissue. The cortex of the left kidney was rather closely beset with caseo-calcareous nodules with fibrous walls ranging in size from a millet to a hempseed.

There were similar nodules in the right, but these were much less numerous; the substance of the right kidney was oedematous, and many of the calyces in both contained collections of gravel.

Suprarenal Bodies.—In the cortex of one suprarenal there was a miliary caseo-calcareous tubercle. The other was normal.

Lumbar Glands.—The lumbar glands were much enlarged (hypertrophied) and contained fairly numerous discrete caseo-calcareous nodules.

Coeliac Glands.—The coeliac glands resembled the portal.

Alimentary Tract.

Tongue, Tonsils, Pharynx.—Normal.

Intestines.—There were small scattered caseous nodules in the Peyer's patches over some of which the mucous membrane was raised and showed a small dimple.

The large intestine was normal.

Mesenteric Glands.—There were scattered caseo-calcareous nodules in the mesenteric glands ranging from a millet seed to a pea in size.

Ileo-colic Glands.—These contained similar but more numerous nodules.

Testicles.—Normal.

Eyes.—Normal.

Larynx.—The mucous membrane of the larynx showed just below each vocal chord a flattened greyish nodule containing yellow points.

Trachea.—Normal.

Various Lymphatic Glands.

The *Popliteal*, *Precrural*, *Iliac*, *Pharyngeal*, *Parotideal*, *Submaxillary*, *Ventral Mediastinal and Pudic Glands* contained caseo-calcareous nodules up to 5 mm. in diameter.

Axillary Glands.—The right contained two or three caseo-calcareous tubercles, the left was normal.

Each *Gluteal Gland* contained one nodule the size of a barley grain.

Ischiatic Glands.—Normal.

CAT 11. Virus H. 69. "F.K."

Intraperitoneal inoculation of culture derived from the human meninges through Guinea-pig 1924.

Dose—1·0 milligramme.

Date of Inoculation—November 29, 1906.

Died—December 16, 1906. [17 days after inoculation.]

Weights.

	Grammes.
November 29, 1906	2900
December 16, 1906	2080

Loss of weight.—820 grammes.

POST-MORTEM EXAMINATION.

Abdomen.

The peritoneal cavity contained a small quantity of blood-stained serous fluid.

Omentum and Peritoneum.—The omentum was fatty and not retracted; near the pylorus there were a few indefinite yellow tubercles, the size of millet seeds.

There were no tubercles on the mesentery or peritoneum.

Spleen.—The spleen was slightly enlarged, and very dark. No tubercles were seen in it.

Liver.—In the left lobe there was a firm yellow nodule projecting slightly from the surface and extending deeply into the substance, measuring about 1·5 by 1 by 1 cm.; between this nodule and the margin of the lobe there was a wedge-shaped greyish patch firmer than the surrounding liver substance and sharply marked off from it; the liver substance otherwise was normal.

Portal, Lumbar, and Iliac Glands.—These glands showed no caseation.

Kidneys.—In the cortex of the left there were two pin-head sized grey tubercles; in that of the right there was an indefinite grey point.

Suprarenal Bodies.—Normal.

Thorax.

Lungs.—The lungs did not collapse well, and were firm and congested and had a greyish appearance as if infiltrated with small tubercles; no distinct tubercles could however be made out; pieces taken from any part of the lung floated in water.

Bronchial Glands.—Normal.

Ventral Mediastinal Glands.—These glands were enlarged and oedematous and showed irregular yellow patches of necrosis.

Microscopical Examination.

(Smear Preparations.)

Liver Nodule.—Tubercle bacilli very numerous.

Scraping from Lung.—Tubercle bacilli numerous.

Scraping from Liver.—Tubercle bacilli numerous, but not so numerous as in the lung.

Scraping from Spleen.—Tubercle bacilli numerous, but not so numerous as in the lung.

CAT 13. Virus H. 69. "F.K."

Subcutaneous inoculation of culture derived from the human meninges through Guinea-pig 1924.

Dose—1·0 milligramme.

Date of Inoculation—November 29, 1906.

Killed when ill—January 4, 1907. [36 days after inoculation.]

Weights.

	Grammes.
November 29, 1906	2350
January 4, 1907	1650

Loss of weight.—700 grammes.

POST-MORTEM EXAMINATION.

Local Lesion.—At the seat of inoculation in the lower part of the abdomen there was an elongated ulcerous excavation measuring 4 by 1·2 cm. filled with yellow curdy caseous masses; the edges of the skin surrounding the excavation were raised and everted, the margins were formed by soft caseo-purulent material.

The subcutaneous tissues between the ulcer and the inguinal glands were thickened, oedematous and suppurating.

Inguinal Glands.—Those on the right side formes a mass measuring 2·5 by 2 by 1·2 cm. which on section was composed throughout of yellow caseo-necrotic substance beginning to break down. In the caseous substance there were a few small islets of translucent tissue.

The glands on the left side formed a similar but smaller mass. The tissues surrounding the glands were thickened and oedematous, and the skin over them was adherent but not ulcerated.

Axillary Glands.—The axillary glands were slightly enlarged and congested but not otherwise abnormal.

Thorax.

Lungs.—The lungs were congested but showed no areas of consolidation, they were closely beset with grey tubercles, the largest about 1 mm. in diameter, some slightly opaque in the centre; they contained also a few larger nodules up to a hemp seed in size yellow and caseous in the centre.

Thoracic Glands. — The bronchial glands were slightly enlarged but showed no definite foci of caseation.

The sternal glands were much enlarged and composed throughout of yellow friable caseo-necrotic substance.

Pleura.—The parietal pleura was normal. The ventral mediastinal pleura showed a number of grey tubercles.

Heart.—Normal.

Abdomen.

Omentum and Peritoneum.—Normal.

Spleen.—The spleen was much enlarged and closely reset with greyish yellow tubercles, the largest 0·5 mm. in diameter. It contained also numerous larger tubercles the largest the size of a hemp seed, of a greyish-yellow colour.

Liver.—The liver contained very numerous tubercles ranging in size from a mere point up to that of a millet seed or slightly larger ; the smaller ones were greyish white the larger ones yellowish.

Portal Gland.—The portal gland was enlarged and closely beset with yellowish caseous nodules up to 3 or 4 mm. in diameter.

A coeliac gland was similarly affected.

Iliac Glands.—These were enlarged and oedematous but contained a few caseous foci only.

Lumbar Glands.—Normal.

Kidneys.—The kidneys showed no macroscopic tubercles.

Suprarenal Bodies.—Normal.

Mesenteric Glands.—Normal.

Submaxillary and Cervical Glands.—One submaxillary gland showed part of the cortex caseous. The other submaxillary and the cervical glands contained caseous foci.

Thyroid Body.—The thyroid body showed in each half a pin head sized yellowish tubercle.

Microscopical Examination.

(Smear Preparations.)

Sternal Gland.—Tubercle bacilli numerous.

Thyroid Body.—Tubercle bacilli numerous.

Marrow (*Femur*).—Tubercle bacilli scanty.

Liver.—Tubercle bacilli numerous.

Faeces.—Tubercle bacilli numerous.

VIRUS H. 70. "N.W."

PRIMARY ABDOMINAL TUBERCULOSIS.

VIRUS H. 70. "N.W."

PRIMARY ABDOMINAL TUBERCULOSIS.

(June 18, 1906.)

CULTURE INOCULATIONS.

CERVICAL GLANDS, NOVEMBER 10, 1906.

The strain was derived from the human cervical glands through G.P. 1933, and had been in artificial cultivation a total period of 62 days.

The culture used was the 4th generation, 21 days old.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
998	Intrav.	1·0 mg.	D. 26 days	Miliary T. of lungs and kidneys; enlargement and caseation of bronchial glands.
999	Intrap.	1·0 mg.	K. 188 ,,	Chronic G.T.
1001	Subcut.	10·0 mg.	K. 188 ,,	Local T. Slight T. of lungs.
1003	Fed	10·0 mg.	K. 188 ,,	One caseous nodule in lung; no T. elsewhere.

FEEDING EXPERIMENT

With the culture derived from the human lung, on April 15, 1907.

The total duration of artificial cultivation was 301 days, and the culture used was of the 15th generation, 21 days old.

PIG 101.

Fed.

Dose: 50·0 mg.

Killed: Sept. 16, 1907.

154 days.

P.M.—The submaxillary, retro-pharyngeal, left parotideal, several mesenteric and ileo-colic glands contained a varying number of calcareo-caseous nodules and tubercles, the largest 4 mm. in diameter. There was no tuberculosis elsewhere.

CAT 41.

Fed.

Dose: 50·0 mg.

Killed after 108 days.

P.M.—No tuberculosis.

DOG 37.

Fed.

Dose: 50·0 mg.

Killed after 99 days.

P.M.—In the retro-pharyngeal glands were three or four small yellow foci; two were seen also in one mesenteric gland. In the liver there were three minute foci of doubtful nature. No tuberculosis elsewhere.

VIRUS H. 70. "N.W."—*continued.*

CULTURE INOCULATIONS—*continued.*

BRONCHIAL GLANDS, NOVEMBER 5, 1906.

The strain was derived from the human bronchial glands, direct; it had been in artificial cultivation a total period of 140 days.

The culture used was the 7th generation, 20 days old.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
979	Intrav.	1·0 mg.	D. 131 days	Chronic G. T.
980	Intrav.	0·1 mg.	D. 178 ,,	Chronic G. T.
975	Intrap.	10·0 mg.	D. 14 ,,	Early G. T. Cause of death not apparent.
976	Intrap.	1·0 mg.	K. 183 ,,	Chronic G. T.
977	Subcut.	10·0 mg.	K. 183 ,,	Two tubercles in lungs only.
978	Subcut.	1·0 mg.	K. 183 ,,	Local lesion, and three tubercles in lungs.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
1976	Intrap.	0·1 mg.	D. 40 days	G. T.
1974	Subcut.	1·0 mg.	D. 88 ,,	G. T.
1975	Subcut.	1·0 mg.	D. 77 ,,	G. T.
1977	Subcut.	0·1 mg.	D. 75 ,,	G. T.

RATS.

Number.	Method.	Dose.	Duration of Life.	Result.
48	Subcut.	10·0 mg.	D. 74 days	Local T. Death from other causes.
49	Intrap. and Subcut.	10·0 mg.	D. 53 ,,	Acute T.

MESENTERIC GLANDS, NOVEMBER 5, 1906.

The strain was derived from the human mesenteric glands, through G.P. 1928, and had been in cultivation a total period of 50 days.

The culture used was the 4th generation, 20 days old.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
973	Intrav.	1·0 mg.	D. 140 days	G. T.
974	Intrav.	0·1 mg.	D. 123 ,,	G. T.
969	Intrap.	10·0 mg.	K. 140 ,,	Slight G. T. Injection partly intracoecal.
970	Intrap.	1·0 mg.	K. 140 ,,	G. T.
971	Subcut.	10·0 mg.	K. 140 ,,	Slight G. T.
972	Subcut.	1·0 mg.	K. 140 ,,	Slight G. T.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
1970	Intrap.	1·0 mg.	D. 20 days	G. T.
1972	Intrap.	0·1 mg.	D. 40 ,,	G. T.
1971	Subcut.	1·0 mg.	D. 82 ,,	G. T.
1973	Subcut.	0·1 mg.	D. 96 ,,	G. T.

LUNG. I.—November 6, 1906.

The strain was isolated directly from the human lung, and had been in cultivation a total period of 141 days.

The culture used was of the 5th generation, 21 days old.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
984	Intrav.	1·0 mg.	D. 36 days	G. T.
981	Subcut.	10·0 mg.	K. 170 „	Local lesion; one tubercle in one kidney.
982	Subcut.	1·0 mg.	K. 170 „	Local lesion; slight T. of lungs.

GUINEA-PIGS (Feeding Experiment).

Number.	Method.	Dose.	Duration of Life.	Result.
1978	Fed	10·0 mg.	D. 121 days	Chronic G. T.
1979	Fed	10·0 mg.	D. 91 „	Chronic G. T.
1980	Fed	1·0 mg.	D. 160 „	Chronic G. T.
1981	Fed	1·0 mg.	D. 206 „	Chronic G. T.
1982	Fed	0·1 mg.	D. 169 „	Chronic G. T.
1983	Fed	0·1 mg.	D. 72 „	G. T.

LUNG. II.—March 5, 1907.

Same strain.

Total duration of artificial cultivation: 260 days.

The culture used was of the 12th generation, 21 days old.

CATS.

Number.	Method.	Dose.	Duration of Life.	Result.
29	Intrap.	50·0 mg.	D. 77 days	T. of omentum and lungs; amount of tuberculosis not sufficient to account for death.
27	Intrap.	10·0 mg.	K. 86 „	Local T. only.
	Subcut.	50·0 mg.	D. 29 „	Local lesion. T. of nearest glands. Death apparently due to toxaemia.

DOGS.

Number.	Method.	Dose.	Duration of Life.	Result.
27 [Puppy].	Intrap.	10·0 mg.	D. 61 days	Tuberculous peritonitis; general tuberculosis.
29	Intrap.	10·0 mg.	K. 413 „ (when very ill).	Local tuberculosis; tuberculous pleurisy and pericarditis (severe) and tuberculosis of lungs (not very severe) and kidneys (slight).
25 [Puppy].	Subcut.	10·0 mg.	K. 143 „	At the site of inoculation there were two small scars. The adjacent glands were normal. No tuberculosis.

CULTURE.

Derived from the omentum of Dog 29.

Duration of artificial cultivation, 147 days. The culture used for inoculation on September 15, 1908, was the 6th generation 21 days old.

RABBIT 2007.

Subcutaneous.

Dose: 42·0 mg.

Killed after 168 days.

P.M.—Local lesion and T. of lungs and kidneys.

VIRUS H. 70. "N.W."—*continued.*

RABBIT PASSAGE.

Culture derived from the human mesenteric glands, through Guinea-pig 1928.

RABBIT 973.

Intravenous.

Dose : 1·0 mg. November 5, 1906.

Died : March 25, 1907.

140 days.

P.M.—The lungs contained numerous discrete gritty caseous tubercles, and in the thin margins there were several caseous areas. The kidneys showed numerous pits and scars on the surfaces, and contained caseous streaks and foci in the medullae, and caseo-pus in the pelves. The testicles (enlarged), the vesiculae seminales and the seminal tubes were filled with caseo-pus. Caseous tubercles were sparsely scattered throughout the muscles. T.B. were numerous in an emulsion of the lung, and in smears from a testicle and the vesiculae seminales.

RABBIT 1227.

Intraperitoneal.

Emulsion of lung.

Killed (very ill) : December 20, 1907.

270 days.

P.M.—The omentum contained a number of caseo-purulent nodules ; the peritoneum was normal. On the surface of each kidney were discrete and confluent grey nodules with minute caseous foci, extending as wedges into the substance. The lungs were crepitant and contained fairly numerous firm caseous nodules—the larger being in the caudal lobes, and gritty caseous patches in the margins. The anklejoints and the right elbowjoint were much swollen ; on section the joints were disorganised, and the swellings consisted of caseating substance. One testicle was enlarged and caseous, and there were nodules in the epididymis and on the meso-testis of the other.

RABBIT 1613.

Subcutaneous.

Emulsion of lung (T.B. scanty).

Died : March 3, 1908.

74 days.

P.M.—There was a cyst the size of a hen's egg at the seat of inoculation. The lungs contained a number of large irregular reddish nodules with central caseous foci and tracts. One kidney contained a single tubercle. There was no tuberculosis elsewhere.

RABBIT 1749.

Subcutaneous.

Emulsion of lung (T.B. scanty).

Died : May 19, 1908.

77 days.

P.M.—At the seat of inoculation there was a group of softened caseous nodules surrounded by miliary caseous tubercles set in fibroid tissue. The scapular glands contained softened caseous foci. There was one tubercle in one kidney. The cause of death was not apparent.

RABBIT 1614.

Subcutaneous.

Emulsion of anklejoint (T.B. numerous).

Died : December 31, 1907.

11 days.

P.M.—Cellulitis.

RABBIT 1615.

Intravenous.

Emulsion of anklejoint (T.B. numerous).

Died : June 26, 1908.

189 days.

P.M.—On the surface of the cephalic lobes of the lungs there were moderately numerous irregular caseous nodules and foci, and on the caudal lobes numerous small yellowish tubercles ; the lungs were crepitant and on section showed a few caseous tubercles. The surfaces of the kidneys showed many depressions, with an occasional greyish white patch which extended into the cortex and contained caseous foci ; in the medulla of one kidney were four yellow gritty streaks. There was no tuberculosis elsewhere.

PIG 101. Virus H. 70. "N.W."

Fed with culture derived from the human lung, direct.

Dose—50·0 milligrammes.

Date of Inoculation—April 15, 1907. [Age 12½ weeks.]

Killed when in good health—September 16, 1907. [154 days after inoculation.]

Clinical Notes.

The pig remained well and grew rapidly during the experiment.

Tuberculin Test.—July 5, 1907. Reacted. Rise of temperature, 1·4° C.

Weights.

	cwt.	qrs.	lbs.
April 15, 1907	0	1	20
September 16, 1907	1	2	1

Total gain of weight.—1 cwt. 0 qr. 9 lbs.

Average rate of gain per week.—5·5 lbs.

POST-MORTEM EXAMINATION.

The carcass was very fat.

Alimentary Tract.

Tongue, Pharynx, Palate, Tonsils.—Normal.

Submaxillary Glands.—The right submaxillary gland contained discrete calcareo-caseous nodules, the largest 2 mm. in diameter; in the left there were two calcareo-caseous nodules and several small calcareous tubercles; neither gland was enlarged.

Retropharyngeal Glands.—The left retropharyngeal gland was not obviously enlarged but was rather closely beset with softened caseo-calcareous nodules the largest 4 mm. in diameter.

In the right retropharyngeal gland there were only two or three caseo-calcareous nodules.

Parotideal Glands.—The left parotideal gland contained four calcareo-caseous nodules. The right was normal.

Stomach and Intestines.—Normal.

Mesenteric Glands.—The mesenteric glands were normal in size; three or four at each extremity of the mesentery showed on section scattered discrete irregular calcareous or calcareo-caseous nodules which varied in size up to about 2 mm. in greatest diameter; the rest of the mesenteric glands were either normal or contained an occasional calcareo-caseous nodule; the nodules readily shelled out from normal looking gland tissue.

Ileo-colic Glands.—Several ileo-colic glands contained similar discrete nodules.

Abdomen.

Liver and Portal Glands, Spleen, Kidneys and Suprarenal Bodies, Renal, Lumbar, and Iliac Glands.—Normal.

Thorax.

Pleura, Lungs, Heart, Thoracic Glands, Larynx and Trachea.—Normal.

Various Lymphatic Glands.

Cervical, Axillary, Prescapular and Inguinal Glands.—Normal.

Microscopical Eamination.

Emulsion of nodules from a Mesenteric Gland.—No tubercle bacilli seen.

Note.—Three egg tubes sown with an emulsion made from one of the mesenteric gland nodules remained sterile.

DOG 25. [Puppy.] Virus H. 70. "N.W."

Subcutaneous inoculation of culture derived from the human lung, direct.

Dose—10·0 milligrammes.

Date of Inoculation—March 5, 1907. [Age about 6 weeks.]

Killed when in good health—July 26, 1907. [143 days after inoculation.]

Clinical Notes.

At the beginning of the experiment the dog was quite a small puppy about six weeks old; its general health was unaffected by the inoculation, and it grew up into a very big strong animal; its weight at death was 24 lbs. 14 oz.

At the seat of inoculation in the abdominal wall a tumour quickly appeared, and the skin over it broke down in two places; typical ulcers were formed, and these after a time began slowly to heal.

Temperature.—The temperature of the dog was recorded from June 11 to July 5, 1907. It was normal during this period, the maximum range of variation being 0·7° C. (38·8°–39·5° C.).

Tuberculin Test.—July 5, 1907. [122 days after inoculation.] Slight reaction? Rise of temperature, 0·5° C.

POST-MORTEM EXAMINATION.

Carcass in very good condition.

Local Lesion.—The skin of the abdomen near the umbilicus showed two small scars; there was no sign of tuberculosis in the subcutaneous tissues.

Inguinal Glands.—Normal.

All the organs and the other glands were examined and found to be normal.

DOG 27. [Puppy.] Virus H. 70. "N.W."

Intraperitoneal inoculation of culture derived from the human lung, direct.

Dose—10·0 milligrammes.

Date of Inoculation—March 5, 1907. [Age about 6 weeks.]

Died—May 5, 1907. [61 days after inoculation.]

Weight at death—2960 grammes.

POST-MORTEM EXAMINATION.

Abdomen.

The peritoneal cavity was filled with clear yellow serous fluid.

Omentum.—The omentum was greatly thickened and formed a large smooth transverse tumour composed of a dense fibroid tissue containing opaque whitish patches of caseation. There were similar masses of tuberculous tissue in the gastric, splenic, and the small omentum.

Peritoneum.—The parietal peritoneum showed very sparsely scattered grey miliary tubercles. The mesentery and meso-colon showed fairly numerous grey foci, a small number of grey nodules up to a hemp seed in size, and near the gut a number of firm grey tuberculous masses up to 1 cm. in diameter, which on section showed around the periphery small greyish yellow patches of necrosis.

Spleen.—The spleen was pale and of about normal size. On section no tubercles were seen in the pulp.

Liver.—The liver showed on its surface numerous flat filmy tubercles, confluent in places; in the substance under the capsule as well as in the depth were extremely numerous small grey tubercles, here and there aggregated together.

Portal Gland.—The portal gland was much enlarged, and showed on section a few early foci and streaks of caseation.

Coeliac Gland.—The coeliac gland was almost wholly composed of creamy-white breaking-down caseo-necrotic substance.

Kidneys.—Each kidney showed in the cortex and medulla a few pale grey translucent miliary tubercles, some slightly opaque in the centre.

Lumbar Glands.—The lumbar glands were enlarged, indurated, and showed on section opaque creamy-white patches and an irregular network of caseation, in a translucent grey matrix.

Iliac Glands.—The iliac glands were slightly enlarged and were firmer than normal; one showed a few yellow streaks of caseation.

Thorax.

The pleural cavity was filled with clear yellow serous fluid.

Pleura.—The parietal pleura showed numerous minute grey granules.

Lungs.—The lungs were collapsed and deeply congested; they contained fairly numerous discrete grey tubercles ranging in size from a mere point up to a millet seed; the larger ones were opaque in the centre, the smaller ones were translucent throughout.

Bronchial Glands.—The bronchial glands were enlarged and indurated. The intertracheo-bronchial glands showed early caseation. The praetracheo-bronchial glands were grey and translucent throughout.

Sternal Glands.—The sternal glands were much enlarged and composed throughout of opaque yellowish-white firm caseating tissue; the capsules were much thickened.

Heart.—Normal.

Alimentary Tract.

Tonsils and Pharynx.—Normal.

Glands of the Neck.—Normal.

Intestines.—Normal.

Pyloric Gland.—The pyloric gland was much enlarged and showed the greater part of its substance composed of firm somewhat translucent grey tissue containing opaque streaks and foci of caseation.

Mesenteric Glands.—The mesenteric glands were not apparently enlarged; they showed in the cortex discrete greyish tubercles.

Ileo-colic Glands.—One of the ileo-colic glands showed early caseation in some parts of the cortex.

Microscopical Examination.

Spleen.—Tubercle bacilli scanty.

Liver.—Tubercle bacilli fairly numerous.

Lumbar Gland.—Tubercle bacilli very numerous.

Sternal Gland.—Tubercle bacilli exceedingly numerous.

Marrow of the Femur.—Tubercle bacilli scanty.

DOG 29. [Adult female.] Virus H. 70. "N.W."

Intraperitoneal inoculation of culture derived from the human lung.

Dose—10·0 milligrammes.

Date of inoculation—March 5, 1907.

Killed when very ill—April 21, 1908. [413 days after inoculation.]

Clinical Notes.

Shortly after inoculation the dog became very ill; the coat was staring, the skin was hot and the appetite poor; she remained ill for several weeks; then she showed some improvement and there was a gradual return to a more or less normal condition of health. She was, however, quieter and less playful, and passed most of the day lying down. On the last day of the experiment, when made to walk, she seemed very weak, and after a few steps became very breathless and fell to the ground. She was weak probably from long inaction, but the breathlessness was no doubt due to the pleural effusion.

Weight.

At death—18 lbs. 5 ozs.

POST-MORTEM EXAMINATION.

The body was in moderately good condition; there was a fair amount of subcutaneous and abdominal fat.

Abdomen.

Omentum.—The great omentum contained a tumour the size of a small orange, to which the stomach and large intestine were adherent. On section the tumour was composed of greenish yellow, caseo-necrotic substance resembling wet wash-leather, but not so tough, divided by fibrous trabeculae into masses of various sizes; these caseous masses could be withdrawn *en masse* from the tumour leaving irregular cavities with smooth internal surfaces.

In the small omentum there was a mass the size of a broad bean, similar in structure to the tumour in the great omentum.

Mesentery and Peritoneum.—Normal.

Pyloric Gland.—The pyloric gland was enlarged and fibroid, and showed on section scattered tough yellow foci.

Spleen.—The spleen was normal in size and showed on the surface a few flat greyish growths up to 1·5 mm. in diameter; the pulp was normal.

Liver.—The liver was congested, yellow and bile-stained. No tubercles were visible in it.

Kidneys.—In the cortex of each kidney there were scattered tubercles up to 1 mm. in diameter, the majority grey with minute opaque centres, a few yellowish and opaque throughout. (A smear from one of the latter showed no T.B.)

Thorax.

The right pleural cavity was filled and distended (the right side of the chest bulged considerably) with straw-coloured serous fluid, floating in which were a few yellow flakes and one large fibrino-purulent mass; the pericardium was also filled with fluid, and there was a small quantity in the left pleural cavity. On the right pleura, chiefly on that covering the sternum and costal cartilages, there were small patches of yellow fibrinous pus. The right lung was lightly adherent to the parietal wall and showed on the surface patches of fibrino-pus similar to those on the parietal pleura.

Lungs.—The caudal lobe, the middle lobe, and the dorsal part of the cephalic lobe on the right side were collapsed and quite airless; the ventral part of the cephalic lobe was crepitant. In the caudal lobe there were two masses, each 1·5 cm. in greatest diameter, which on section were yellow and caseous, soft and purulent in places but for the most part tough; the pleura over one of these masses showed an erosion about 5 mm. in diameter from which caseous substance projected; the lung was adherent at this point to the costal pleura. In the right cephalic lobe there was a caseous nodule about 1 cm. in diameter.

The left lung was congested and oedematous, but still air-containing; just under the pleura of the dorsal surface of the caudal lobe there was a caseous mass 1·5 by 0·8 cm. with a cavity in the centre partly filled with yellow pus; there were besides two pin-head sized yellow tubercles.

Bronchial Glands.—Normal.

Sternal Glands.—Normal.

Heart.—Normal.

All the other organs and glands were examined and appeared normal.

Microscopical Examination.

Emulsion from Omental Tumour.—Tubercle bacilli numerous.

Smear from Pyloric Gland.—A moderate number of tubercle bacilli.

Lung (caseous mass in right lung).—Very numerous tubercle bacilli, mainly in small clumps.

Pus from Right Pleura.—Moderately numerous tubercle bacilli.

Pleural Fluid.—No tubercle bacilli.

Kidney (yellow focus).—No tubercle bacilli.

Liver (scraping).—No tubercle bacilli.

Spleen (scraping).—No tubercle bacilli.

Animals Inoculated.

Rabbit 1829 was inoculated intravenously with an emulsion made from the omental tumour. It was killed when well after 174 days, and showed tuberculosis of lungs, pleura, and kidneys. Other organs and all the glands were normal.

Guinea-pig 3031 was inoculated intraperitoneally with the same emulsion (larger dose). It died in 71 days of severe general tuberculosis.

Guinea-pig 3030 was inoculated intraperitoneally with 4·0 cc. of pleural fluid. It died in 86 days of general tuberculosis.

DOG 37. [Young animal.] Virus H. 70. "N.W."

Fed with culture derived from the human lung, direct.

Dose—50·0 milligrammes.

Date of Inoculation—April 15, 1907.

Killed when in good health—July 23, 1907. [99 days after inoculation.]

Temperature.—The temperature of the dog was recorded from June 11 to July 5, 1907. During this period it was normal, the range of variation being 0·6° C. (38·7–39·3° C.).

Tuberculin Test.—July 5, 1907. [81 days after infection.] No reaction. Rise of temperature, 0·1° C.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Alimentary Tract.

Tongue, Pharynx, Tonsils.—Normal.

Retropharyngeal Glands.—The right seemed a little larger than the left and showed on section two or three yellow foci. In the gland on the left side a doubtful focus was seen.

Intestines.—Normal.

Mesenteric Glands.—The large posterior mesenteric gland showed at the margin of the cortex under the capsule a minute yellow focus; in the depth of this gland there was a pinhead sized body with a yellowish centre which shelled out. Other mesenteric and the colic glands were normal.

Thorax.

Pleura.—Normal.

Lungs.—Under the pleura of each cephalic lobe, on the external surface, there was a cluster of discrete hard grey bodies, the largest about a millimetre in diameter, not apparently tuberculous; otherwise the lungs were normal.

Bronchial Glands.—Normal.

Heart.—Normal.

Abdomen.

Peritoneum and Omentum.—Normal.

Spleen.—Normal.

Liver.—Three minute greyish foci were seen under the capsule.

Portal Gland.—Normal.

Kidneys.—Normal.

Lumbar and Iliac Glands.—Normal.

Microscopical Examination.

Tubercle from Right Retropharyngeal Gland.—Tubercle bacilli; three seen.

Tubercle from Left Retropharyngeal Gland.—No tubercle bacilli seen.

Minute yellow focus from Mesenteric Gland.—No tubercle bacilli seen.

Pinhead sized focus from Mesenteric Gland.—No tubercle bacilli seen.

CAT 25. Virus H. 70. "N.W."

Subcutaneous inoculation of culture derived from the human lung, direct.

Dose—50·0 milligrammes.

Date of Inoculation—March 5, 1907.

Died—April 3, 1907. [29 days after inoculation.]

Weights.

	grammes.
March 5, 1907	2,200
April 3, 1907	1,400

Total loss of weight.—800 grammes.

POST-MORTEM EXAMINATION.

Local Lesion.—Over the posterior dorsal vertebrae and ribs there was a large flattened swelling measuring 9 by 8 cm. by about 1·5 cm. in thickness, the skin over which was honeycombed with ulcers varying in size, the largest being 3 cm. across and covered with masses of dried caseo-pus. On section the swelling was composed of firm caseous substance adherent to both the skin and the muscles; it showed in the centre a large flat irregular cavity the internal walls of which were irregular softened and necrotic.

Prescapular Glands.—The glands in front of the scapula on each side, two in number, were enlarged up to the size of a French bean; two were firm and caseous throughout, the others were partly caseous.

Axillary Glands.—The left axillary gland the size of a broad bean was composed almost throughout of dense yellow caseous tissue. The right was not found.

Pectoral Glands.—A pectoral gland on each side was enlarged but not caseous.

Other glands and all the organs were normal to the naked eye.

Microscopical Examination.

(Smears from)—

Lung.—Tubercle bacilli, scanty.

Liver.—Tubercle bacilli, scanty.

Spleen.—Tubercle bacilli, fairly numerous.

Kidney.—Tubercle bacilli, scanty.

Suprarenal.—No tubercle bacilli.

Pectoral Gland.—Tubercle bacilli.

Mesenteric Gland.—Tubercle bacilli, scanty.

CAT 27. Virus H. 70. "N.W."

Intraperitoneal inoculation of culture derived from the human lung, direct.

Dose—10·0 milligrammes.

Date of Inoculation—March 5, 1907.

Killed when ill—May 30, 1907. [86 days after inoculation.]

Weights.

	grammes.
March 5, 1907	2,350
May 30, 1907	1,350

Total loss of weight.—1,000 grammes.

POST-MORTEM EXAMINATION.

Omentum and Peritoneum.—The omentum appeared normal. The parietal peritoneum on the right side showed a patch composed of short connective tissue tags; there were no tubercles. Adhering to the walls of the small intestine at two places, thus forming a small loop, there was an irregular mass about the size of a thrush's egg composed of dense yellowish-white caseo-necrotic tissue; the muscle wall of the intestine was not infiltrated and the mucous membrane was intact; the mass was situated and had apparently originated in the mesentery (? inoculum); it caused slight narrowing of the lumen of the gut.

Spleen, Liver, Kidneys, Suprarenal Bodies, and Abdominal Glands.—Normal.

Lungs.—The lungs were crepitant and collapsed normally; they showed on the surface, particularly of the dorsal parts of the caudal lobes, milky white spots, up to about 1·5 mm. in diameter, which could be barely felt under the finger and which did not penetrate the lung parenchyma; they had not the appearance of tubercles.

Thoracic Glands, Pleura, Heart.—Normal.

Microscopical Examinations.

(Smears from)—

Mesenteric Nodule.—Numerous tubercle bacilli.

Focus from Lung.—No tubercle bacilli.

Scraping from Spleen.—Two tubercle bacilli seen.

CAT 29. Virus H. 70. "N.W."

Intraperitoneal inoculation of culture derived from the human lung, direct.

Dose—50·0 milligrammes.

Date of Inoculation—March 5, 1907.

Died—May 21, 1907. [77 days after inoculation.]

Weights.

	Grammes.
March 5, 1907	3450
May 21, 1907	1750

Total loss of weight.—1,700 grammes.

POST-MORTEM EXAMINATION.

Omentum and Peritoneum.—The omentum was retracted and moderately thickened externally, and showed yellowish white areas separated by a small amount of translucent fibroid tissue; on section the yellowish-white areas were tough and opaque. There were no tubercles on the peritoneum or mesentery.

Spleen.—The spleen was somewhat atrophied and showed patches of grey membrane on the surface; no tubercles were seen in the pulp.

Liver.—The liver was almost completely covered with a thin uniform grey membrane, which could be peeled off; the organ was otherwise normal.

Kidneys.—The kidneys were pale, but showed no tubercles.

Suprarenal Bodies, Intestines, and Abdominal Lymphatic Glands.—Normal.

Lungs.—The lungs were crepitant and collapsed normally; they were somewhat pigmented, and showed under the pleura scattered grey translucent tubercles, irregular in outline and without any sign of central necrosis; they were most numerous in the caudal lobes and were here and there loosely aggregated together; just beneath the pleura of one of the caudal lobes was a slight raised disc-like nodule about 1 cm. in diameter and 2 mm. in thickness; it was composed of dense caseous areas surrounded by translucent fibroid tissue. On section of the lungs tubercles were very sparsely scattered.

Bronchial Glands.—Pigmented, otherwise normal.

Pleura, Heart.—Normal.

Brain.—Normal.

CAT 41. Virus H. 70. "N.W."

Fed with culture derived from the human lung, direct.

Dose—50·0 milligrammes.

Date of Inoculation—April 15, 1907.

Killed—August 1, 1907. [108 days after feeding.]

Weights.

	Grammes.
April 15, 1907	3250
August 1, 1907	2300

Total loss of weight.—950 grammes.

POST-MORTEM EXAMINATION.

Pharynx and Tonsils.—Normal.

Lymphatic Glands in the Neck.—Normal.

Abdominal Organs and Lymphatic Glands.—Normal.

Lungs.—The lungs were crepitant throughout; along the mediastinal border of one of the caudal lobes there was a series of translucent homogeneous grey nodules, the largest 2 or 2·5 mm. in diameter; no tubercles or nodules were seen elsewhere.

Bronchial Glands, Heart, and Pleura.—Normal.

Microscopical Examination.

(Smears from)—

Mesenteric Gland.—No tubercle bacilli.

Nodule from Lung.—No tubercle bacilli. Numerous worm-like embryos.

VIRUS H. 72. "H.C."

TUBERCULOSIS OF A RIB.

VIRUS H. 72. "H.C."

CALF PASSAGE.

CULTURE.

Derived from the original material through G.P. 1945. Duration of artificial cultivation, 82 days.

November 13, 1906.

CALF 1165.
Subcutaneous.
Dose : 100·0 mg.
Killed : February 19, 1907.
98 days.

P.M.—Collapsed and ulcerated abscess at seat of inoculation; two fibro-calcareo-caseous masses in prescapular gland. No tuberculosis elsewhere.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1004	Intrav.	1·0 mg.	D. 146 days	Chronic G. T.
1005	Intrav.	0·1 mg.	D. 173 "	Slight T., with pseudo-tuberculosis of mesenteric glands and spleen.
1006	Subcut.	50·0 mg.	D. 183 "	Local lesion and slight T. of an axillary gland and the lungs. Death from other causes.
1007	Subcut.	10·0 mg.	K. 113 "	Local lesion and slight T. of lungs.

Emulsion of prescapular gland into :
GUINEA-PIGS 2263–2264.
Killed : 21 days. Early G. T.

March 12, 1907. Emulsion of G.P.'s tissues, estimated to contain 22,255,000 T.B. per cc.

CALF 1189.
Subcutaneous.
Dose : 267,060,000 T. B.
Killed : June 21, 1907.
101 days.

P.M.—Fibro-caseous tumour at seat of inoculation. The prescapular gland was caseous almost throughout; a large caseo-purulent swelling projected from its surface. In the lungs was a small number of fibro-caseous nodules (1–3 mm.); there were two in one kidney.

RABBIT 1202.
Subcutaneous.
Dose : 22,255,000 T. B.
Killed : 120 days.
P.M.—Local lesion and three tubercles in the lungs.

Emulsion of nodules from lung into :
GUINEA-PIGS 2478–2479.
Killed : 21 days. Very slight T.

GUINEA-PIGS 2496–2498.
Killed : 29 days. G. T.

Emulsion of prepectoral gland into :
GUINEA-PIG 2481.
Killed : 21 days. Slight G. T.

GUINEA-PIGS 2499–2502.
Killed : 29 days. G. T.

Emulsion of prepectoral gland into :
RABBITS.

Number.	Method.	Duration of Life.	Result.
1348	Subcut.	K. 118 days	Local lesion only

CALF 1247.

Subcutaneous.
Dose : 20·0 cc. of emulsion.
Killed : Dec. 16, 1907.
128 days.

P.M.—At the seat of inoculation there were two cystic tumours, one subcutaneous, the other intramuscular. The adjacent glands contained small fibro-calcareous patches and yellow foci. The lungs showed half-a-dozen transparent (?) tubercles ; there were several calcareous tubercles in each suprarenal. The thoracic abdominal and many peripheral glands contained one or many tubercles mostly calcareous.

RABBIT.

Number.	Method.	Dose.	Duration of Life.	Result.
1436	Subcut.	1·0 cc.	K. 186 days	Local lesion ; one tubercle in one kidney and one tubercle in the lungs.

CULTURE.

[Derived from the precrural gland of Calf 1247. Duration of artificial cultivation : 95 days. The 5th generation of culture, 4 days old, was used for inoculation on March 20, 1908.]

CALF 1365.

Subcutaneous.
Dose : 50·0 mg.
Killed : July 13, 1908.
115 days.

P.M.—Large local tumour of which the major portion was a cyst with caseo-purulent contents. The prescapular gland was mainly caseous and fibro-calcareous. In the lungs there were a dozen calcareous foci and a small nodule ; a few small foci were seen in the heart. The spleen contained a few calcareous tubercles, the suprarenals several caseous tubercles each, the small intestine scattered foci, the peritoneum some fibrous tubercles. Every lymphatic gland in the body contained small caseous or calcareous tubercles or foci.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1784	Intrav.	0·5 mg.	D. 152 days	T. of lungs (moderately severe) and kidneys.
1786	Intrav.	0·1 mg.	D. 118 „	Slight T. of lungs, bronchial glands, kidneys, and liver.
1785	Subcut.	8·0 mg.	D. 397 „	Local lesion ; slight T. of kidneys ; lungs extensively caseous, many of the caseous areas being softened and cystic.

CALF 1299.

Subcutaneous.
Dose : 20·0 cc. of emulsion.
Killed : Dec. 17, 1907. 129 days.

P.M.—The local tumour consisted of a thick fibrous capsule surrounding a caseous sequestrum. The left prescapular gland showed dense gritty caseous patches. The thoracic, one portal, the mesenteric and ileo-colic glands contained scattered calcareous tubercles, the majority very small.

RABBIT.

Number.	Method.	Dose.	Duration of Life.	Result.
1437	Subcut.	4·0 cc.	K. 186 days	Local lesion and slight T. of lungs.

Emulsion of bronchial gland into :

GUINEA-PIG 2854.

Killed : 28 days. Early slight G. T.

CULTURE.

[Derived from the sternal gland of the guinea-pig. Duration of artificial cultivation : 60 days. The 6th generation of culture, 9 days old, was used for inoculation on March 14, 1908.]

CALF 1389.

Subcutaneous. Dose : 50·0 mg.
Killed : July 17, 1908. 125 days.

P.M.—Large cyst containing caseo-pus. Left prescapular gland contained a large softening caseous mass ; a prepectoral was caseous throughout. One tubercle in one suprarenal. A few minute foci in thoracic and one portal gland. Most of the glands of the alimentary tract, and the popliteal and the right gluteal glands, contained one or more caseous or calcareous tubercles.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1769	Subcut.	10·0 mg.	K. 439 days	Local lesion and slight T. of lungs.
1770	Subcut.	8·0 mg.	D. 38 „	Local T. Death from psorospermosis.

CULTURE.

[Derived from the popliteal gland of Calf 1389. Duration of artificial cultivation : 78 days. The 5th generation of culture, 12 days old, was used for inoculation on October 3, 1908.]

CALF 1431.

Subcutaneous. Dose : 50·0 mg.
Killed : January 13, 1909. 102 days.

P.M.—There was a collapsed abscess at the seat of inoculation. The left prescapular gland was composed of softened caseous substance surrounded by a zone of calcareo-caseous material. A left cervical gland was partly caseo-calcareous. There were a few scattered caseo-calcareous or calcareous tubercles in the thoracic, one portal, the ileo-colic and some of the mesenteric glands.

RABBIT 2022.

Subcutaneous.
Dose : 10·0 mg.
Killed : 151 days.

P.M.—Local lesion and slight T. of lungs.

VIRUS H. 72. "H.C."

(August 3, 1906.)

CULTURE INOCULATION, NOVEMBER 13, 1906.

The strain was derived from the original material (pus from a rib abscess), through G.P. 1945, and had been in artificial cultivation for a total period of 82 days.

The culture used was the 6th generation, 21 days old.

CALF 1165.

Subcutaneous.

Dose : 100·0 mg.

Killed : February 19, 1907.

98 days.

P.M.—Collapsed and ulcerated abscess at seat of inoculation; two large fibro-calcareo-caseous nodules occupied two-thirds of the left prescapular gland. There was no tuberculosis elsewhere.

GUINEA-PIGS.

	Number.	Method.	Duration of Life.	Result.
E. of spleen	2261	Intrap.	K. 58 days	Healthy.
E. of prescapular gland.	2262	Intrap.	K. 21 "	Early G. T.
	2263	Intrap.	K. 21 "	" "
	2264	Intrap.	K. 21 "	" "

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1004	Intrav.	1·0 mg.	D. 146 days	Chronic G. T.
1005	Intrav.	0·1 mg.	D. 173 "	Slight T., with pseudo-tuberculosis of mesenteric glands and spleen.
1008	Intrap.	10·0 mg.	K. 183 "	Chronic G. T.
1009	Intrap. Subcut.	1·0 mg. 1·0 mg.	K. 183 "	Chronic G. T., with pseudo-tuberculosis of mesenteric glands and spleen.
1006	Subcut.	50·0 mg.	D. 183 "	Local lesion and slight T. of an axillary gland and the lungs. Death from other causes.
1007	Subcut.	10·0 mg.	K. 183 "	Local lesion and slight T. of lungs.
1010	Fed.	10·0 mg.	K. 183 "	A few calcareous grains in a submaxillary gland only.
1011	Fed.	10·0 mg.	D. 7 "	No T.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
1993	Intrap.	1·0 mg.	D. 25 days	G. T.
1995	Intrap.	0·1 mg.	D. 41 "	G. T.
1994	Subcut.	1·0 mg.	D. 44 "	G. T.
1996	Subcut.	0·1 mg.	D. 122 "	G. T.

CALF 1165. Virus H. 72. "H.C."

Subcutaneous inoculation of culture derived from the original material (pus from rib abscess) through G.P. 1945.

Dose—100·0 milligrammes.

Date—November 13, 1906.

Weight at Inoculation—1 cwt. 1 qr. 24 lbs. [Age about 16 weeks.]

Killed when in good health—February 19, 1907. [98 days after inoculation.]

Clinical Notes.

Three weeks after the inoculation on the left side of the neck there was a very large prominent local swelling extending from the middle of the neck into the anterior part of the dewlap, measuring 17·7 by 9 cm. by about 5 cm. in thickness. The adjacent prescapular gland was nearly 13 cm. in length. The tissues at the inferior extremity of the gland and the tumour were oedematous.

The tumour subsequently became soft and fluctuating; early in February it opened and discharged; subsequently it diminished considerably in size.

The calf showed no illness during the experiment.

Temperature.—On the 8th day after inoculation the temperature rose to 39·8° C., and reached a maximum of 41·1° C. on the 16th day. On the 24th day it had returned to the normal (39·0° C.). The temperature afterwards remained normal until the calf was killed.

Tuberculin Test.—January 31, 1907. [79 days after inoculation.] Slight reaction. Rise of temperature, 0·7° C.

Weights.

The calf gained weight normally during the experiment.

		cwt.	qrs.	lbs.
November 13, 1906	...	1	1	24
February 19, 1907	...	2	1	3

Total gain of weight.—3 qrs. 7 lbs.

Average rate of gain per week.—6·5 lbs.

POST-MORTEM EXAMINATION.

General Condition.—Very good.

Local Lesion.—In the subcutaneous tissues on the left side of the neck there was a collapsed abscess (7 by 7 by 3 cm.) composed of a fibrous wall and fibrous trabeculæ compressed together; the spaces between the trabeculæ and the walls of the abscess contained a small quantity of yellow caseo-pus and communicated externally through an ulcer in the skin, measuring about 2 cm. in diameter; this ulcer was situated in the centre of the tumour, at the bottom of a funnel-shaped depression in the skin which was covered with dried discharge; the skin all around the ulcer over the marginal part of the tumour was very greatly thickened, measuring at one place 2 cm. in thickness. In the fibrous tissue of the walls and the trabeculæ were caseo-calcareous streaks.

Left Prescapular Gland.—The left prescapular gland measured 6 by 3·5 by 2 cm. and showed about two thirds of the gland substance replaced by two fibro-calcareo-caseous masses, one 3·5 cm. the other 2 cm. in greatest diameter. The larger of the two contained in the centre several small cavities filled with caseo-pus.

Right Prescapular Gland.—The right prescapular gland measured 5 by 2·5 by 1·5 cm. and was normal on section.

Prepectoral Glands.—Normal.

Axillary Glands.—Normal.

Thorax.

Pleura, Lungs, Thoracic Glands, and Heart.—Normal.

Abdomen.

Peritoneum, Spleen, Liver and Portal Glands, Kidneys and Suprarenals, Renal, Lumbar, and Iliac Glands.—Normal.

Alimentary Tract.

Tongue, Pharynx, Palate, and Tonsils.—Normal.

Pharyngeal, Submaxillary, Hyoid, and Subparotid Glands.—Normal.

Intestines.—Normal.

Mesenteric Glands.—Normal.

Genito-Urinary System.

Testes.—Normal.

Various Lymphatic Glands.

Precrural, Popliteal, Gluteal, Ischiatic, and Pudic.—Normal.

Microscopical Examination.

Emulsion of Prescapular Gland.—Tubercle bacilli numerous.

Animals Inoculated.

Guinea-pig 2261, intraperitoneal, emulsion of spleen; killed after 58 days; healthy.

Guinea-pigs 2262–2264, intraperitoneal, emulsion of prescapular gland; killed after 21 days; early G.T.

CALF 1189. Virus H. 72. "H.C."

Subcutaneous inoculation of emulsion of lesions from Guinea-pigs 2263–2264, infected from the prescapular gland of Calf 1165.

Dose—267,060,000 T.B. (Vol. 12·0 cc. E = 22,255,000 T.B. per cc.)

Date of Inoculation—March 12, 1907. [Age about 18 weeks.]

Killed when in good health—June 21, 1907. [101 days after inoculation.]

Clinical Notes.

A tumour of moderate size developed at the seat of inoculation on the left side of the neck; on the 38th day it measured 11·5 by 6·5 by about 4 cm., and was prominent and circumscribed. The adjacent prescapular gland measured 9 cm. in length and was hard and freely moveable. The calf was in good health.

The tumour increased in size; on the 63rd day it measured 13 by 8 by 7 cm. and was soft and fluctuating. The prescapular gland was 8 cm. in length; a prepectoral gland the size of a marble could be felt.

The tumour subsequently opened and discharged caseo-purulent matter.

On the 101st day the calf was killed when in good health.

Temperature.—On the 8th day the temperature rose to 40·5° C. and remained high (between 39·0 and 40·2° C.) for three weeks. Subsequently it was quite normal.

Tuberculin Test.—The calf was not tested subsequent to inoculation.

Weights.

	cwt.	qrs.	lbs.
March 12, 1907	1	2	15
June 21, 1907	2	0	7

Total gain of weight.—1 qr. 20 lbs.

Average rate of gain per week.—3·3 lbs.

POST-MORTEM EXAMINATION.

Carcass.—In good condition.

Local Lesion.—At the seat of inoculation on the left side of the neck there was a firm tumour measuring 10 by 6 by 4 cm., composed of dense fibrous tissue beset with soft yellow caseous nodules up to 1 cm. in diameter, and greatly thickened skin; the fibrous tissue was brownish and translucent in the centre of the tumour, whitish around the periphery; the skin showed towards the lower extremity an irregular funnel shaped puckered scar, at the apex of which was a small pocket containing caseo-pus.

Left Prescapular Gland.—The left prescapular gland measured 7 by 5 by 4 cm. and on section was caseous almost throughout; the caseous substance was partly dense and gritty and partly purulent; projecting from the external surface of the gland was a cystic swelling almost as large as the gland itself; this had a thick fibrous wall and thick creamy caseo-purulent contents and communicated with the interior of the gland through a wide opening in the capsule.

Right Prescapular Gland.—Normal in size and on section.

Left Prepectoral Glands.—The spherical gland was enlarged and contained a breaking-down caseo-calcareous nodule 1 cm. in greatest diameter.

Axillary and Right Prepectoral Glands.—Normal.

Thorax.

Pleura.—Normal.

Lungs.—The lungs were crepitant throughout and showed evenly distributed in small number throughout the parenchyma spherical nodules ranging in size from 1 to 3 mm. in diameter; the nodules had fibrous walls and soft caseous gritty contents.

Thoracic Glands, Heart.—Normal.

Abdomen.

Omentum and Peritoneum, Spleen.—Normal.

Liver.—Sparsely scattered throughout the liver substance were minute yellow foci; no definite tubercles were seen.

Portal Glands.—Normal.

Kidneys.—In the cortex of the right kidney there were two oval nodules each rather less than a wheat grain in size with grey margins and yellowish gritty centres. The left was normal.

Suprarenal Bodies, Renal, Lumbar, and Iliac Glands.—Normal.

Alimentary Tract.

Tongue, Pharynx, Palate, Tonsils.—Normal.

Pharyngeal, Submaxillary, Hyoid, and Parotideal Glands.—Normal.

Intestines, Mesenteric Glands.—Normal.

Genito-Urinary Tract.

Testicles.—Normal.

Various Lymphatic Glands.

Precrural, Popliteal, Gluteal, Ischiatic, and Pudic.—Normal.

Microscopical Examination.

Emulsion of Prepectoral Gland.—Tubercle bacilli very scanty.

Emulsion of Six Tubercles from Lung.—No tubercle bacilli seen.

Lung, Crushed Tubercle from.—No tubercle bacilli seen.

Kidney, Crushed Tubercle from.—No tubercle bacilli seen.

Liver, Foci from.—No tubercle bacilli seen.

Animals Inoculated.

Two rabbits [1348–1349] were inoculated subcutaneously with an emulsion of the prepectoral gland. They were found to have local lesions only when killed 118 days later.

Two guinea-pigs [2480–2481] were inoculated intraperitoneally with the same emulsion. Both became tuberculous.

Two guinea-pigs [2478–2479] were inoculated intraperitoneally with an emulsion of the lung nodules. Both became tuberculous.

CALF 1247. Virus H. 72. "H.C."

Subcutaneous inoculation of an emulsion made from various tissues of Guinea-pigs 2496, 2497, infected from guinea-pigs inoculated with an emulsion of the lung of Calf 1189.

Dose—20·0 cc. of emulsion containing numerous tubercle bacilli.

Date of Inoculation—August 10, 1907. [Age about 10 weeks.]

Killed when in good health—December 16, 1907. [128 days after inoculation.]

Clinical Notes.

Seventeen days after the inoculation on the left side of the neck there was a large tender local tumour measuring 10·5 by 10 cm.; the adjacent prescapular gland was 9 cm. in length. The calf looked seedy and appeared to have lost flesh; the temperature was very high (40·8° C.).

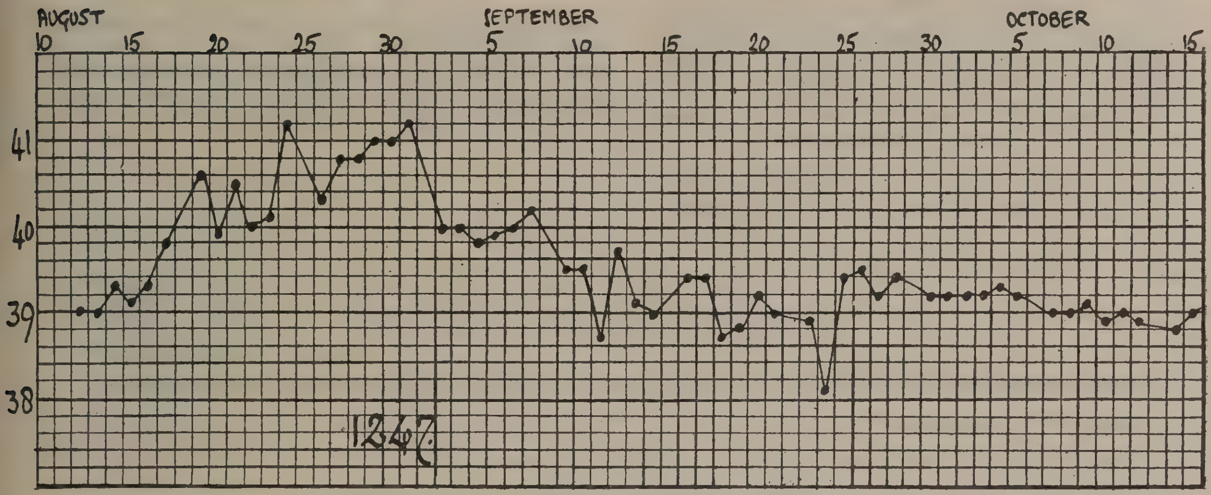
During the following week the animal was very unwell; he usually stood with head down and back humped, his coat was staring, and he was very thin and weak; there was no marked increase in respiration. At the end of the week the tumour measured 16 by 12 cm., and was hard, hot, and flat; the left prescapular gland was attached to it and measured about 12 cm. in length. Below and beneath the gland numerous nodules could be felt, ? enlarged prepectoral glands. The dewlap was oedematous. The temperature was high.

The calf subsequently improved rapidly in general health and condition, and the temperature slowly fell to the normal.

On October 18, 69 days after inoculation, the calf was quite well and the temperature normal; the tumour was very large and consisted of two parts, one subcutaneous soft and doughy, and measuring 13 by 11 cm. in superficial area, the other intramuscular hard and irregular, continuous with the subcutaneous part along the upper border. The prescapular gland had diminished considerably in size; it was now softer than it had been, and was only 7 cm. in length. A prepectoral gland adjacent to it was the size of a walnut.

On December 16 the calf was killed; it had remained well since October.

Temperature. (Chart to October 15.)



From October 15 to December 16 the temperature was normal.

Tuberculin Test.

October 24, 1907. [75 days after inoculation.] Reacted. Rise of temperature, 1·8° C.

Weights.

The weight was not recorded at any intermediate period during the experiment, but [judging from the appearance of the animal] there was undoubtedly a considerable loss of weight during the first month, and a large increase subsequently, involving a net gain of over 3 qrs.

	cwt.	qrs.	lbs.
August 10, 1907	1	0	1
December 16, 1907	1	3	4

Total gain of weight.—3 qrs. 3 lbs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion—At the seat of inoculation on the left side of the neck there were two cystic swellings, one subcutaneous and one intramuscular, which on removal were found to be connected only along the superior margins by a band of fibrous tissue; the subcutaneous swelling measured 12 by 11 by 5 cm., the intramuscular 10 by 9 by 4 cm.

On section both swellings were fibrous-walled cysts, crossed by numerous fibrous trabeculae, filled with brownish watery turbid fluid containing caseous flocculi and small gritty caseo-calcareous masses.

Left Prescapular Gland.—The left prescapular gland measured 5·5 by 3 by 1·5 cm.; just under the capsule scattered irregular yellow foci up to 1·5 cm. in diameter were seen; on section these foci were caseous and calcareous and were quite superficial; there were besides a few small fibro-calcareous patches (a culture was made from one of the latter).

Right Prescapular Gland.—The right prescapular gland measured 3·5 by 1·6 by 1 cm. and was normal on section.

Prepectoral Glands.—On the left side one 1·5 cm. in greatest diameter showed half its substance composed of a fibroid mass closely beset with minute calcareous foci; another was normal.

On the right side one contained a caseo-calcareous miliary tubercle; another was normal.

Cervical Glands.—A gland just within the entrance to the thorax on the left side contained fibro-calcareous patches similar to those in the left prepectoral gland. Other cervical glands were normal.

Axillary Glands.—Normal.

Thorax.

Lungs.—The lungs were crepitant throughout and perfectly normal in general appearance; on close inspection about half-a-dozen irregular grey transparent spots were seen under the pleura; on section they had a definite outline and were probably tubercles; nothing was seen on section of the lung.

Thoracic Glands.—The bronchial and dorsal mediastinal glands were normal in size; the long mediastinal gland showed in the cortex a yellow caseo-calcareous tubercle 2 mm. in diameter and several minute whitish foci, some of which were perceptibly gritty; the other glands contained very sparsely scattered minute calcareous tubercles and an occasional larger caseo-calcareous tubercle.

Pleura, Heart, Larynx, and Trachea.—Normal.

Abdomen.

Omentum and Peritoneum, Spleen, Liver, and Kidneys.—Normal.

Portal Glands.—In the cortex of one there was a grey millet-seed sized tubercle with a calcareous centre. The rest were normal.

Suprarenal Bodies.—In the cortex of each there were from six to nine yellow calcareous tubercles ranging in size from a mere point up to a little more than 1 mm. in diameter.

Coeliac, Lumbar, Iliac, and Renal Glands.—Normal.

Alimentary Tract.

Tongue, Tonsils, and Pharynx; Submaxillary, Retropharyngeal, Parotideal and Hyoid Glands; Intestines.—Normal.

Mesenteric Glands.—Six caseo-calcareous tubercles, the largest the size of a millet seed, were found in the mesenteric glands.

Ileo-Colic Glands.—All the ileo-colic glands showed a number of calcareous nodules up to a hemp seed in size.

Mamma.—Normal.

Supramammary (Pudic) Glands.—One contained a millet-seed sized caseo-calcareous tubercle.

Peripheral Lymphatic Glands.

Precrural Glands.—In the cortex of the right there was one caseo-calcareous tubercle 2 mm. in diameter; in the cortex of the left there were two.

Popliteal Glands.—Each popliteal gland contained about a dozen yellow caseo-calcareous tubercles, the largest about the size of a millet seed.

Gluteal Glands.—The right gluteal contained a pin-head sized calcareous tubercle; the left contained two millet-seed sized caseo-calcareous tubercles.

Ischiatic Glands.—Each contained a number of yellow tubercles similar to those in the popliteal glands.

Microscopical Examination.

Emulsion of parts of the Popliteal Glands and one Tubercle from a Precrural Gland. — One tubercle bacillus seen.

Emulsion of the Left Prescapular Gland.—Tubercle bacilli in moderate numbers, long and beaded.

Animals Inoculated.

Guinea-pigs 2849, 2850, and 2851 were inoculated intraperitoneally with an emulsion made from a precrural and the popliteal glands. No. 2849 died prematurely in 6 days, the others were killed after 28 days and showed early general tuberculosis.

CALF 1365. Virus H. 72. "H.C."

Subcutaneous inoculation of culture derived from the precrural gland of Calf 1247 (2nd passage).

Dose—50·0 milligrammes.

Date of Inoculation—March 20, 1908. [Age about 14 weeks.]

Killed when in good health—July 13, 1908. [115 days after inoculation.]

Clinical Notes.

The calf appeared well during the period of the experiment.

Temperature.

The temperature rose to 39·8° C. on the 12th day after inoculation and reached a maximum of 40·2° C. on the 14th day. It remained above the normal for eighteen days, and then fell to 38·4° C.; subsequently the temperature was irregular, though approximately normal; the range of variation diminished towards the close of the experiment.

Tuberculin Test.

The calf was not tested subsequent to inoculation.

Weights.

	cwt.	qrs.	lbs.
March 20, 1908	1	1	2
July 13, 1908	1	2	26

Total gain of weight.—1 qr. 24 lbs.

Average rate of gain per week.—3·2 lbs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—On the left side of the neck there was a prominent circumscribed fluctuating tumour which measured 16 by 9 by 5 cm.; on section the major part of the tumour was a cyst with thick fibrous walls and caseo-purulent contents; the cavity was crossed by fibrous trabeculae; the lower part of the tumour was dense fibrous and contained caseo-calcareous tracts. In the muscles beneath the tumour there was a mass (8 by 6 by 2 cm.) of tuberculous tissue similar to that composing the lower part of the tumour.

Left Prescapular Gland.—The left prescapular gland measured 8·5 by 5 by 2·5 cm. and showed from two-thirds to three-quarters of its bulk composed of dense caseous and fibro-calcareous substance.

Right Prescapular Gland.—The right prescapular gland measured 4·5 by 2 by 1 cm. and contained about a dozen caseous gritty tubercles the largest the size of a millet seed.

Prepectoral Glands.—One on the left side was much enlarged measuring 3·2 cm. in greatest diameter, dense and caseous throughout and only slightly gritty from calcification. Two others contained discrete calcareous tubercles.

In those on the right side there were a few minute gritty foci.

Cervical Glands.—One of the lower cervical glands on the left side was slightly enlarged indurated and contained fairly numerous calcareous foci; other cervical glands contained scattered tubercles some caseous, others calcareous.

Axillary Glands.—There were a few minute calcareous tubercles in the cortex of each axillary gland: five were counted in the right.

Thorax.

Pleura.—Normal.

Lungs.—The lungs were crepitant throughout. On the surface of the caudal lobes there were numerous grey fibrous granulations or vegetations. At the posterior tip of the right caudal lobe just under the pleura there was a reddish nodule 2 to 3 mm. in diameter containing a few calcareous and soft whitish foci; elsewhere in the caudal lobes after careful search about a dozen minute calcareous foci were found; one calcareous focus was seen in one of the small anterior lobes.

Thoracic Glands.—The bronchial and mediastinal glands were not enlarged: the long mediastinal gland showed sparsely scattered minute calcareous foci in the cortex, the others contained moderately numerous minute evenly distributed calcareous foci.

Heart.—On the endocardium of the left auricle there were two slightly raised greyish foci and two or three whitish points under the endocardium; otherwise the heart was normal.

Abdomen.

Omentum.—Normal.

Peritoneum.—On the floor of the abdomen and around the margins of the ribs there were scattered pearly grey fibrous tubercles the largest 2 mm. in diameter.

Spleen.—The spleen was normal in size and showed in the pulp sparsely scattered miliary tubercles with calcareous centres and grey margins; four were counted on one longitudinal cut surface.

Liver.—Normal.

Portal Glands.—The portal glands were not enlarged: they showed however in the cortex fairly numerous irregular calcareous foci mainly discrete but here and there aggregated together.

Kidneys.—Normal.

Suprarenal Bodies.—The left suprarenal body showed in the cortex about ten yellow caseous tubercles, slightly gritty from calcification, ranging from 1 to 1·5 mm. in diameter: there was about the same number of similar tubercles in the right suprarenal.

Alimentary Tract.

Tongue, Pharynx, Tonsils.—Normal.

The Submaxillary, Retro-pharyngeal and Parotideal Glands contained scattered tubercles up to 1 mm. in diameter, the larger ones caseo-calcareous, the smaller completely calcareous.

Intestines.—Two of the small Peyer's patches showed several yellow gritty foci the largest the size of a pin's head. There were similar foci scattered throughout the whole length of the long Peyer's patch in the ileum. The large intestine was normal.

Mesenteric Glands.—The mesenteric glands contained tubercles similar to those in the portal glands but not so numerous.

Ileo-Colic Glands.—The ileo-colic glands resembled the portal.

Various Lymphatic Glands.

Precrural.—In the cortex of each there were three or four small tubercles the largest barely 1 mm. in diameter; some were quite calcareous others caseo-calcareous. There were similar but rather more numerous tubercles in the *Iliac, Lumbar and Coeliac Glands.*

Popliteal, Gluteal and Ischiatic.—These glands were similar to the precrural.

Testicles.—Normal.

Microscopical Examinations.

Focus from the Heart.—No tubercle bacilli seen.

Emulsion of Tubercle from Suprarenal.—A few tubercle bacilli seen.

Foci from Small Intestine.—A few tubercle bacilli seen.

Emulsion of Mediastinal Gland.—No tubercle bacilli seen.

Emulsion of Portal Gland.—A few tubercle bacilli seen.

CALF 1299. Virus H. 72. "H.C."

Subcutaneous inoculation of an emulsion made from various tissues of Guinea-pigs 2499–2502, infected from a guinea-pig inoculated with an emulsion of the prepectoral gland of Calf 1189.

Dose—20·0 cc. of emulsion containing numerous tubercle bacilli.

Date of Inoculation—August 10, 1907. [Age about 10 weeks.]

Killed when in good health—December 17, 1907. [129 days after inoculation.]

Clinical Notes.

Seventeen days after the inoculation on the left side of the neck there was a pear-shaped local tumour measuring 13 by 10 cm. The left prescapular gland was large and firm, 10 cm. in length. The temperature was raised (40·3°C.), and the calf looked a little seedy.

The tumour rapidly increased in size; four days later it measured 17 by 11 cm., and the gland was 13 cm. in length. The calf appeared well and lively and was in fairly good condition; the temperature was falling (39·6°C.).

Subsequently the tumour and the gland decreased considerably in size; two months after inoculation the former measured 14 by 9 cm., and was firm, well-defined, and slightly raised; the latter was hard, 8 cm. in length. The calf was quite well, and the temperature normal.

Temperature.

On the 10th day after inoculation the temperature rose to 40·0°C. and remained high for 19 days. The maximum temperature recorded during this period was 40·5°C. (on the 12th day). Subsequently the temperature remained normal.

Tuberculin Test.

October 24. [75 days after inoculation.] Reacted. Rise of temperature, 2·3°C.

Weights.

	cwt.	lbs.
August 10, 1907	1	4
December 17, 1907	2	16

Total gain of weight.—1 cwt. 12 lbs.

Average rate of gain per week.—6·9 lbs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—In the subcutaneous tissues on the left side of the neck there was a firm tumour measuring 7 by 5 by 2·5 cm. On section it was composed of a thick fibrous capsule (5 mm.) and a dense yellow caseous sequestrum slightly gritty from calcification, separated from the capsule by a thin layer of turbid brownish fluid.

Left Prescapular Gland.—The left prescapular gland measured 4 by 2·7 by 2 cm. On section half of the cortex, opposite the hilum, showed dense caseous patches of various sizes, gritty around the margins and surrounded by fibrous tissue.

Right Prescapular Gland.—The right prescapular gland measured 4·5 by 2·3 by 1 cm. and was normal on section.

Prepectoral, Axillary, and Cervical Glands.—Normal.

Thorax.

Lungs.—The lungs were crepitant throughout; no tubercles were seen.

Thoracic Glands.—The dorsal mediastinal, and bronchial glands were normal in size; each showed in the cortex a few minute calcareous tubercles, the largest about 0·5 mm. in diameter; the tubercles were more numerous in the inter-bronchial glands than in the bronchial or the mediastinal.

Pleura, Heart.—Normal.

Abdomen.

Omentum and Peritoneum, Spleen and Liver.—Normal.

Kidneys.—On the surface of each kidney a number of small pits were seen; otherwise the kidneys were normal.

Suprarenal Bodies.—Normal.

Portal Glands.—In the cortex of one a minute calcareous grain was found; the rest were normal.

Coeliac, Renal, Lumbar, and Iliac Glands.—Normal.

Alimentary Tract.

Tongue, Pharynx, Tonsils; Submaxillary, Retro-pharyngeal, and Parotideal Glands, Intestines.—Normal.

Mesenteric Glands.—The mesenteric glands contained sparsely scattered irregular calcareous tubercles, the largest 1·mm. in diameter, the smallest just visible.

Ileo-Colic Glands.—These glands contained similar tubercles, one or two measuring as much as 1·5 mm. in diameter.

Testicles.—Normal.

Various Lymphatic Glands.

Precrural and Popliteal, Gluteal and Ischiatic, Pudic.—Normal.

Microscopical Examination.

Emulsion of Left Prescapular Gland.—Tubercle bacilli moderately numerous.

Emulsion of Left Bronchial Gland.—No tubercle bacilli seen.

Animals Inoculated.

Two Guinea-pigs, Nos. 2852 and 2854, were inoculated intraperitoneally with an emulsion made from the left bronchial gland, and one, No. 2853, intraperitoneally with an emulsion made from the liver.

Nos. 2852 and 2853 died prematurely in 16 and 13 days respectively; No. 2854 was killed after 28 days and showed early slight general tuberculosis.

CALF 1389 Virus H. 72. "H.C."

Subcutaneous inoculation of culture derived from the bronchial gland of Calf 1299 through Guinea-pig 2854.

Dose—50·0 milligrammes.

Date of Inoculation—March 14, 1908. [Age about 15 weeks.]

Killed when in good health—July 17, 1908. [125 days after inoculation.]

Clinical Notes.

The animal remained well during the experiment

Temperature.

There was a slight rise of temperature commencing on the 13th day after inoculation, and lasting nine days (maximum 40·1°C.). Subsequently the temperature was normal.

Tuberculin Test.

The calf was not tested subsequent to inoculation.

Weights.

	cwt.	qrs.	lbs.
March 14, 1908	1	1	8
July 17, 1908	2	0	24

Total gain of weight.—3 qrs. 16 lbs.

Average rate of gain per week.—5·5 lbs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—At the seat of inoculation on the left side of the neck there was a large, prominent, fluctuating swelling, measuring 14 by 8·5 by 7·5 cm.; on section it was a cyst with creamy caseo-purulent contents and fibrous wall 5 mm. in greatest thickness; the cavity was crossed by fibrous trabeculae.

Left Prescapular Gland.—The left prescapular gland measured 5·5 by 3·5 by 3 cm.; on section rather more than half the gland was occupied by a softened caseous mass surrounded by gritty fibroid tissue.

Right Prescapular Gland.—The right prescapular gland measured 4·7 by 2 by 1 cm. and was normal on section.

Prepectoral Glands.—On the left side there was a spherical gland 1·5 cm. in diameter which was dense and caseous throughout and slightly gritty; the caseous substance shelled out en masse from a thickened capsule. Other prepectoral glands were normal.

Cervical and Axillary Glands.—Normal.

Thorax.

Lungs.—The lungs were crepitant throughout. No tubercles were seen on the surface or on section.

Thoracic Glands.—A minute gritty focus was found in one mediastinal gland; the rest were normal.

Pleura and Heart.—Normal.

Abdomen.

Omentum and Peritoneum, Spleen, Liver and Kidneys.—Normal.

Suprarenal Bodies.—The right suprarenal body showed in the cortex one pinhead-sized calcareous tubercle. The left was normal.

Portal Glands.—In the cortex of one portal gland there were several very minute yellow calcareous foci; the others were normal.

Coeliac, Lumbar and Iliac Glands.—Normal.

Alimentary Tract.

Tongue, Pharynx, Tonsils.—Normal.

Submaxillary Glands.—The right contained two caseous gritty nodules, the largest 2 mm. in diameter. The left was normal.

Parotideal Glands.—The left contained two, the right four soft yellow caseous nodules, the largest the size of a hemp seed, slightly gritty from calcification.

Retro-pharyngeal Glands.—Normal.

Intestines.—Normal.

Mesenteric Glands.—All the mesenteric glands were affected, showing in the cortex discrete calcareous tubercles varying in size up to that of a millet seed; they were moderately numerous in the terminal glands, more sparsely scattered in the others.

Ileo-Colic Glands.—These glands resembled the terminal mesenteric glands.

Mamma and Supramammary Glands.—Normal.

Various Lymphatic Glands.

Popliteal.—The right contained one caseous slightly gritty tubercle the size of a millet seed. The left contained two similar tubercles.

Gluteal.—There was a caseous gritty tubercle in the right gluteal gland. The left was normal.

Precrural and Ischiatic.—Normal.

Microscopical Examination

Tubercle from the Parotideal Gland.—No tubercle bacilli.

Emulsion of two tubercles from the Popliteal Gland.—No tubercle bacilli.

CALF 1431. Virus H. 72. "H.C."

Subcutaneous inoculation of culture derived from the popliteal gland of Calf 1389.

Dose—50·0 milligrammes.

Date of Inoculation—October 3, 1908. [Age about 5 months.]

Killed when in good health—January 13, 1909. [102 days after inoculation].

Clinical Notes.

A small tumour developed at the seat of inoculation on the left side of the neck, which became soft and fluctuating, and then opened and discharged caseo-purulent contents. The left prescapular gland became considerably enlarged.

The calf remained well during the experiment.

Temperature.

There was a period of pyrexia commencing on the 11th day after inoculation and lasting 17 days (maximum 40·5° C.). The temperature was otherwise normal during the experiment.

Tuberculin Test.

January 7, 1909. [96 days after inoculation.]. Dose, 2·0 cc. Reacted. Rise of temperature, 1·7° C.

Weights.

	cwt.	qrs.	lbs.
October 3, 1908	1	3	1
January 13, 1909	2	0	14

Total gain of weight.—1 qr. 13 lbs.

Average rate of gain per week.—2·9 lbs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—At the seat of inoculation on the left side of the neck there was a tumour measuring 8 by 6 by 3 cm., composed of thickened skin and a subcutaneous mass of pinkish fibroid tissue containing a walnut-sized cavity communicating externally through a short sinus the diameter of a crow quill; the cavity contained caseo-pus, and the hair over the tumour was covered with crusts of discharge.

Left Prescapular Gland.—The left prescapular gland measured 7·7 by 5 by 3 cm.; it had a more rounded outline than usual, and gave a sense of fluctuation. On section it was composed of softened caseous substance surrounded by a zone of firm calcareo-caseous substance and a thin fibrous capsule.

Right Prescapular Gland.—The right prescapular gland measured 4·7 by 2·4 by 1·2 cm., and was normal on section.

Prepectoral Glands.—Normal.

Cervical Glands.—On the left side one of the lower cervical glands was enlarged, and showed about half its substance replaced by breaking-down caseo-calcareous substance. Other cervical glands were normal.

Thorax.

Lungs, Heart, Pleura.—Normal.

Thoracic Glands.—The bronchial and mediastinal glands were normal in size, and contained sparsely scattered calcareous tubercles, the largest a little more than 1 mm. in diameter.

Abdomen.

Omentum and Peritoneum, Spleen, Liver, Kidneys and Suprarenal Bodies.—Normal.

Portal Glands.—In the cortex of one portal gland there was a pinhead-sized caseo-calcareous tubercle; the rest were normal.

Renal, Lumbar and Iliac Glands.—Normal.

Alimentary Tract.

Tongue, Pharynx, Tonsils; Submaxillary, Retro-pharyngeal and Parotideal Glands; Intestines.—Normal.

Mesenteric Glands.—A few very minute calcareous foci were seen in the mesenteric glands.

Ileo-Colic Glands.—These glands showed in the cortex sparsely-scattered caseo-calcareous tubercles up to a millet seed in size.

Testicles.—Normal.

Various Lymphatic Glands.

Precrural and Popliteal, Gluteal, Ischiatic, Pudic.—Normal.

VIRUS H. 74. "D.S."

PRIMARY ABDOMINAL TUBERCULOSIS.

VIRUS H. 74. "D.S."

(November 20, 1906.)

CULTURE INOCULATIONS.

MESENTERIC GLANDS.

I.—February 5, 1907.

The strain was derived from the original material, and had been in cultivation a total period of 77 days.

The culture used was the 6th generation, 21 days old.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1153	Intrav.	1·0 mg.	K. 141 days	Slight chronic G. T.
1154	Intrav.	0·1 mg.	D. 123 "	Very slight G. T. (?) cause of death.
1152	Intrap.	10·0 mg.	D. 55 "	Slight G. T. No obvious cause of death.
1155	Intrap.	1·0 mg.	D. 141 "	Chronic G. T.
1156	Subcut.	20·0 mg.	K. 141 "	Local T. and slight T. of lungs and kidneys.
1157	Subcut.	10·0 mg.	K. 141 "	

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
2228	Intrap.	1·0 mg.	D. 20 days	G. T.
2230	Intrap.	0·1 mg.	D. 34 "	G. T.
2229	Subcut.	1·0 mg.	D. 52 "	G. T.
2231	Subcut.	0·1 mg.	D. 32 "	G. T.

II.—March 20, 1907.

The same strain was used; it had been in cultivation a total period of 120 days.

The culture used was the 8th generation, 21 days old.

CALF 1181.

Subcutaneous.

Dose: 50·0 mg.

Killed: July 16, 1907.

118 days.

P.M.—At the seat of inoculation there was a small fibroid patch infiltrated with calcareous foci. In the left prescapular gland (not enlarged) there were a few calcareous nodules and tubercles. There was no tuberculosis elsewhere.

RABBIT 1210.

Subcutaneous.

Dose: 50·0 mg.

Killed: 112 days.

P.M.—Local tuberculosis and tuberculosis of lungs.

VIRUS H. 74. "D.S." —*continued.*

CULTURE INOCULATIONS—*continued.*

LUNG I.—FEBRUARY 21, 1907.

The strain was derived from the original material, through Guinea-pig 2004, and had been in cultivation a total period of 63 days.

The culture used was the 5th generation, 21 days old.

CATS (Kittens).

Number.	Method.	Dose.	Duration of Life.	Result.
19	Subcut.	1·0 mg.	D. 7 days	Small caseous local lesion. Cause of death not determined.
21	Subcut.	0·1 mg.	D. 2 "	No Tuberculosis.
23	Subcut.	0·01 mg.	D. 72 "	Local Tuberculosis. In the liver were numerous foci of a doubtful nature. Death from causes other than tuberculosis.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1183	Intrav.	1·0 mg.	D. 122 days	T. of lungs and kidneys.
1184	Intrav.	0·1 mg.	K. 126 "	Slight T. of lungs and kidneys.
1185	Intrap.	10·0 mg.	K. 126 "	Slight T. of peritoneum, lungs, and kidneys.
1186	Intrap.	1·0 mg.	K. 126 "	Slight T. of peritoneum, lungs, and kidneys.
1187	Subcut.	10·0 mg.	D. 109 "	Local T. and slight T. of lungs.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result
2266	Intrap.	1·0 mg.	D. 17 days	G. T.
2265	Subcut.	1·0 mg.	D. 67 "	G. T.

LUNG. II.—MARCH 20, 1907.

The strain was derived from the same source, and had been in cultivation a total period of 90 days.

The culture used was the 7th generation, 21 days old.

CALF 1183.
Subcutaneous.
Dose : 50·0 mg.
Killed : July 16, 1907.
118 days.

P.M.—At the seat of inoculation there was a small cystic tumour. In the left prescapular gland were two small calcareous nodules and a few calcareous grains. There was no tuberculosis elsewhere.

RABBIT 1209.
Subcutaneous.
Dose : 10·0 mg.
Killed : 112 days.
P.M.—Local lesion only.

MONKEY 85.
Subcutaneous.
Dose : 0·001 mg.
Died : April 16, 1907.
54 days.
P.M.—General Tuberculosis.

MONKEY 87.
Subcutaneous.
Dose : 0·1 mg.
Died : April 16, 1907.
54 days.
P.M.—General Tuberculosis.

MONKEY 89.
Subcutaneous.
Dose : 1·0 mg.
Died : March 28, 1907.
35 days.
P.M.—General Tuberculosis.

MONKEY 91.
Subcutaneous.
Dose : 10·0 mg.
Died : March 23, 1907.
30 days.
P.M.—General Tuberculosis.

CULTURE INOCULATIONS—*continued.*

BRONCHIAL GLANDS, FEBRUARY 5, 1907.

The strain was derived from the original material, and had been in cultivation a total period of 77 days.

The culture used was the 5th generation, 21 days old.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1146	Intrav.	1·0 mg.	D. 42 days	Miliary T. of lungs and kidneys.
1147	Intrav.	0·1 mg.	D. 246 „	Chronic T. of lungs and kidneys; a few tubercles elsewhere.
1148	Intrap.	10·0 mg.	D. 23 „	G. T. Inoculation partly subcutaneous.
1149	Intrap.	1·0 mg.	D. 67 „	Slight T. ? cause of death.
1150	Subcut.	50·0 mg.	D. 31 „	Slight T. Death due to injuries.
1151	Subcut.	10·0 mg.	D. 50 „	Local T. only.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Res
2224	Intrap.	1·0 mg.	D. 27 days	G. T.
2226	Intrap.	0·1 mg.	D. 38 „	G. T.
2225	Subcut.	1·0 mg.	D. 58 „	G. T.
2227	Subcut.	0·1 mg.	D. 5 „	An infe

SPLEEN, FEBRUARY 14, 1907.

The strain was derived from the original material, and had been in cultivation a total period of 86 days.

The culture used was the 6th generation, 21 days old.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1170	Intrav.	1·0 mg.	D. 33 days	G. T.
1171	Intrap.	10·0 mg.	D. 35 „	Slight T. of peritoneum and (?) of lungs.
1172	Subcut.	46·0 mg.	K. 133 „	Local lesion only.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Res
2259	Intrap.	1·0 mg.	D. 18 days	G. T.
2260	Subcut.	1·0 mg.	D. 52 „	G. T.

CALF 1181. Virus H. 74. "D.S."

Subcutaneous inoculation of culture derived from the mesenteric glands direct.

Dose—50·0 milligrammes.

Date of Inoculation—March 20, 1907. [Age 17 weeks.]

Killed when in good health—July 16, 1907. [118 days after inoculation.]

Clinical Notes.

A small tumour developed at the seat of inoculation on the left side of the neck. A month after inoculation it measured 6·5 by 5 cm. and was prominent and fluctuating. Subsequently it opened and discharged its caseo purulent contents and diminished rapidly in size; at the close of the experiment its site was marked by a thickened patch surrounding a depressed scar.

The adjacent prescapular gland was slightly enlarged a month after inoculation, but was subsequently normal in size.

The calf remained well during the experiment.

Temperature.

The temperature rose to 39·6° C. ten days after inoculation, but soon fell, and remained normal during the remaining period of the experiment, except for a sudden unexplained rise [to 41·1° C.] on the 88th day.

Tuberculin Tests.

No. I. May 9. [50 days after inoculation.] Reacted. Rise of temperature 1·9° C.

No. II. July 5. [107 days after inoculation.] Reacted slightly. Rise of temperature 0·9° C.

Weights.

	cwt.	qrs.	lbs.
March 20, 1907	1	2	17
July 16, 1907	2	1	16

Total gain of weight.—2 qrs. 27 lbs.

Average rate of gain per week.—5 lbs.

POST-MORTEM EXAMINATION.

Carcass.—In good condition.

Local Lesion.—At the seat of inoculation there was a small patch of thickened skin, in the centre of which there was a depressed scar; beneath the latter there was a small conical mass of pinkish fibroid tissue infiltrated with calcareous foci.

Left Prescapular Gland.—The left prescapular gland measured 5·5 by 2·5 by 1·5 cm., and showed on section at one extremity a group of two calcareous nodules each 2·5 mm. in diameter and a few calcareous foci; at the other extremity there were two calcareous tubercles, one the size of a millet-seed the other that of a pin's head.

Right Prescapular Gland.—Measured 5·7 by 2·5 by 1·2 cm. and was normal on section.

Prepectoral and Axillary Glands.—Normal.

Thorax.

Pleura, Lungs, Thoracic Glands, and Heart.—Normal.

Abdomen.

Omentum and Peritoneum, Spleen, Liver and Portal Glands, Kidneys and Suprarenals, Renal, Lumbar, and Iliac Glands.—Normal.

Alimentary Tract.

Tongue, Pharynx, Palate and Tonsils, Submaxillary, Parotideal, Hyoid and Retropharyngeal Glands, Intestines and Mesenteric Glands.—Normal.

Mammary Gland.—Normal.

Various Lymphatic Glands.

Precrural and Popliteal, Gluteal and Ischiatic, and Pudic.—Normal.

CALF 1183. Virus H. 74. "D.S."

Subcutaneous inoculation of culture derived from the lung through Guinea-pig 2004.

Dose—50·0 milligrammes.

Date of Inoculation—March 20, 1907. [Age 17 weeks.]

Killed when in good health—July 16, 1907. [118 days after inoculation.]

Clinical Notes.

A tumour of moderate size developed at the seat of inoculation on the left side of the neck. It reached its maximum size (10 by 7 by about 3 cm.) a month after inoculation, remained stationary for three or four weeks, then diminished a little in size and became soft and fluctuating.

The adjacent prescapular gland became a little enlarged—maximum, 8 cm. in length, on April 19—but diminished in size towards the close of the experiment.

The calf remained in good health.

Temperature.

There was a very slight rise of temperature commencing on the 10th day after inoculation and lasting 10 days (maximum 39·6° C.). Subsequently the temperature remained normal with the exception of a sudden and unexplained rise to 40·9° C. 98 days after inoculation.

Tuberculin Tests.

No. I. May 9, 1907. [50 days after inoculation.] Reacted. Rise of temperature, 1·3° C.

No. II. July 5, 1907. [107 days after inoculation.] No reaction. Rise of temperature, 0·1° C.

Weights.

	cwt.	qrs.	lbs.
March 20, 1907	1	2	11
July 16, 1907	2	1	26

Total gain of weight.—3 qrs. 15 lbs.

Average rate of gain per week.—5·8 lbs.

POST-MORTEM EXAMINATION.

Carcass.—In good condition.

Local Lesion.—At the seat of inoculation on the left side of the neck there was a hemispherical cyst, measuring 8 by 8 by 4 cm., with fibrous walls lined internally with granulation tissue, and creamy caseopurulent contents; the cavity of the cyst was crossed by fibrous trabeculae.

Left Prescapular Gland.—The left prescapular gland measured 7 by 3 by 1·5 cm. and showed on section two calcareous nodules, one the size of a pea the other that of a millet seed, and a few calcareous grains.

Right Prescapular Gland.—Measured 7 by 2·5 by 1·2 cm. and was normal on section.

Prepectoral and Axillary Glands.—Normal.

Thorax.

Pleura.—Normal.

Lungs.—The lungs were normal in general appearance; on section fairly numerous glassy foci none more than 1 mm. in diameter, some quite transparent others a little translucent, were seen scattered throughout the lung parenchyma; they were soft, disappearing when scraped with a knife, and not calcareous.

Thoracic Glands.—Normal.

Heart.—Normal.

Abdomen.

Omentum and Peritoneum, Spleen, Liver and Portal Glands, Kidneys and Suprarenals, Renal, Lumbar and Iliac Glands.—Normal.

Alimentary Tract.

Tongue, Pharynx, Palate, Tonsils; Submaxillary, Parotideal, Hyoid and Retropharyngeal Glands; Intestines and Mesenteric Glands.—Normal.

Testes.—Normal.

Various Lymphatic Glands.

Precrural and Popliteal, Gluteal and Ischiatic, Pudic.—Normal.

Microscopical Examination.

Glassy Focus from Lung.—No tubercle bacilli.

RHESUS MONKEY 85. Virus H. 74. "D.S."

Subcutaneous inoculation of culture derived from the human lung, through Guinea-pig 2004.

Dose—0·001 milligramme.

Date of Inoculation—February 21, 1907. [Age probably not more than six months.]

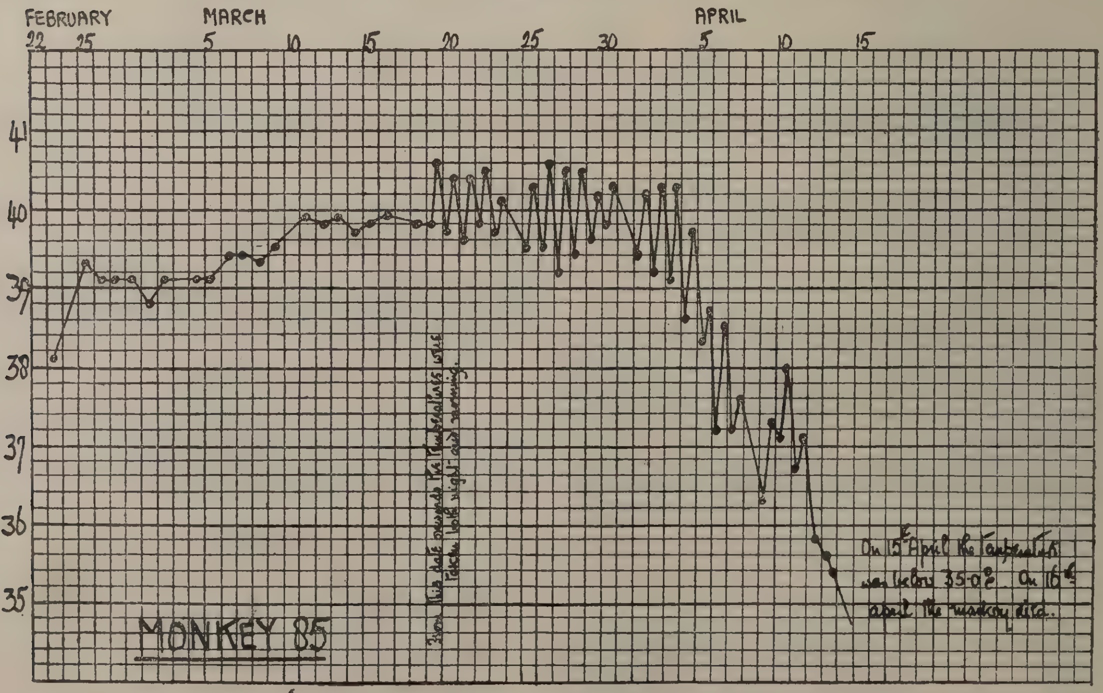
Died—April 16, 1907. [54 days after inoculation.]

Clinical Notes.

A small fluctuating swelling developed at the seat of inoculation between the shoulders; on March 20 this was the size of a broad bean. The axillary glands were then not appreciably enlarged.

Subsequently the swelling opened and discharged, and a gland in the left axilla became much enlarged. The course of the disease in this monkey was almost exactly similar to that of Monkey 87 (which see). The temperature fell, and the animal was first noticed to be ill on April 4, the same day as in the case of 87; and both animals were found dead on the morning of April 16.

Temperature.



POST-MORTEM EXAMINATION.

General Condition.—Emaciated.

Local Lesion.—In the subcutaneous tissues over the angle of the left scapula there was a collapsed cyst, of which the outer wall was formed by thin bluish skin pierced with small ulcers, and the inner of a layer of caseous substance 3 mm. in greatest thickness.

Axillary Glands.—On the right side two contained each a soft caseous nodule 2 mm. in diameter; the rest were normal.

On the left side one was much enlarged, measuring 1·5 cm. in its greatest diameter, caseo-necrotic throughout, and beginning to soften around the margin. Another smaller gland showed three quarters of its substance caseous. A third contained two pin-head sized caseous tubercles.

Inguinal Glands.—An inguinal gland on the right side contained a soft caseous nodule 2 mm. in diameter. There was a similar nodule in one of the glands on the left side

Thorax.

There was no fluid in the pleural cavity. The left lung showed some recent slender adhesions to the chest wall, and a moderately firm adhesion to an enlarged vertebral gland.

Pleura.—The pleura covering the tendon of the diaphragm on the left side showed several small groups of caseous tubercles.

Lungs.—The right middle lobe was completely collapsed and atrophied; it contained three caseous miliary tubercles. Other lobes of the lungs were crepitant except for some small dark red patches of collapse; they contained fairly numerous (much less numerous than in Monkey 87) moderately evenly distributed firm caseous nodules, ranging in size from 1 up to 4 mm., the larger ones being formed apparently by the confluence of several smaller ones.

Bronchial Glands.—The bronchial glands were slightly enlarged and congested; each contained from one to three or four caseous nodules, the largest the size of a hemp seed.

Mediastinal Glands.—The ventral mediastinal glands contained discrete yellow caseous tubercles.

Vertebral Glands.—Two vertebral glands on the left side in the 8th and 10th interspaces were the size of peas and were caseous and softened throughout.

Two on the right side, the size of hemp seeds, in the 10th and 11th interspaces were also caseous throughout.

Heart and Pericardium.—The pericardial sac was distended with clear fluid.

The pericardial surface of the heart was mottled with hæmorrhagic patches. No tubercles were seen in the heart muscle or on the endocardium.

Trachea and Larynx.—Normal.

Abdomen.

There was a slight excess of serous fluid in the peritoneal cavity.

Omentum and Peritoneum.—The omentum contained a few small caseous tubercles, and numerous minute grey granules (early tubercles).

The peritoneal surface of the diaphragm showed numerous flattened caseous tubercles.

Spleen.—The spleen was enlarged, measuring 6 by 3 by 2 cm. in diameter, and was closely beset with soft yellow caseous nodules, the largest 4 mm. in diameter.

One splenic lymphatic gland contained a caseous nodule.

Liver.—The liver was closely adherent to the diaphragm and was with difficulty separated from it; it was slightly adherent also to the stomach; the substance of the liver was closely beset with caseous nodules mostly about 2 mm. in diameter, but varying from about 0·5 to 3 mm.

Portal Gland.—The portal gland was moderately enlarged and showed arranged around its cortex yellow caseous coalescing nodules, the largest 2·5 mm. in diameter.

A gland on the head of the pancreas and the pyloric gland were similarly affected.

Two coeliac glands, slightly enlarged, contained a few pin-head sized caseous tubercles.

Kidneys.—The left kidney showed in the depth of the cortex a firm yellow caseous nodule, 4 mm. in diameter. The right kidney was normal.

Suprarenal Bodies.—Normal.

Lumbar Glands.—One, the size of a pea, was caseous throughout; another was slightly enlarged and partly caseous.

The Iliac and Ilio-sacral Glands contained in all four hemp-seed sized softened caseous nodules.

Alimentary Tract.

Tongue, Pharynx.—Normal.

Glands of the Neck and Throat.—One cervical gland on the right side contained a miliary caseous tubercle; other cervical glands were normal.

A small submental gland was partly caseous and softened. Other glands in the neck were normal.

Intestines.—Normal.

Mesenteric Glands.—The mesenteric glands were slightly enlarged and congested, and showed in the cortices scattered discrete caseous nodules up to 2 mm.

Ileo-colic and Colic Glands.—The former were normal. The latter were slightly enlarged, and one contained a minute grey tubercle.

Brain.—Normal.

RHESUS MONKEY 87. Virus H. 74. "D.S."

Subcutaneous inoculation of culture derived from the human lung through G.P. 2004.

Dose—0·1 milligramme.

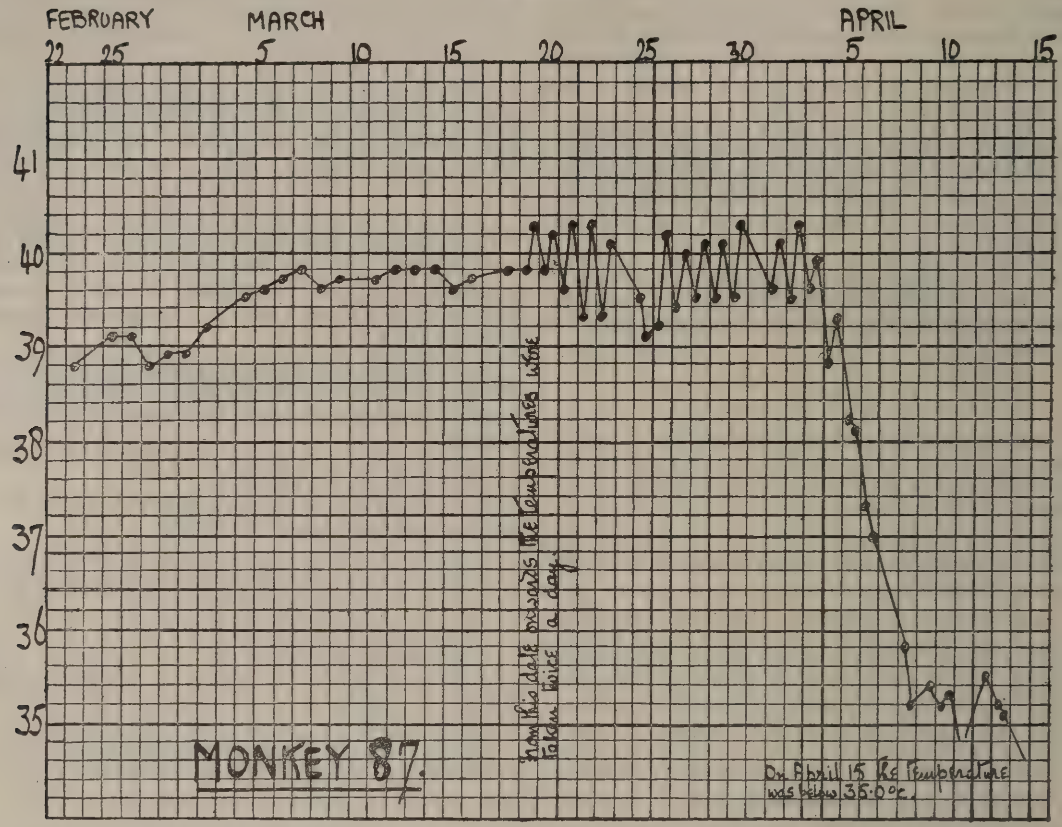
Date of Inoculation—February 21, 1907. [Age probably not more than six months.]

Died—April 16, 1907. [54 days after inoculation.]

Clinical Notes.

A fluctuating tumour developed at the seat of inoculation between the shoulders; this burst and discharged on March 18. Two days later the tumour measured 3·2 by 2·5 cm. The axillary glands were not obviously enlarged. The monkey lost flesh during March, but was active and showed no definite symptoms of illness. On April 4 it was quiet and obviously ill, huddled up in a corner of its cage; the temperature, which up to this time had been high (39·5°–40·3° C.), had fallen to 38·8° C. The monkey gradually became worse, its weakness and emaciation increased, and its temperature fell to 35·0°–36·0° C. On April 16 it was found dead.

Temperature.



POST-MORTEM EXAMINATION.

General Condition.—Emaciated.

Local Lesion.—The skin of the back, immediately posterior to the angle of the right scapula, showed a tuberculous ulcer 4·5 cm. in length by 2 cm. in breadth, with raised slightly undermined margins and caseous base 4 mm. in greatest thickness; the floor of the ulcer was dry, except at one part where there was soft caseo-pus.

Axillary Glands.—On the right side, one, 1·5 cm. in greatest diameter, was caseous and softened throughout. Three others the size of small peas were caseous practically throughout, whilst a fifth showed a few discrete miliary caseous tubercles.

One axillary gland on the left side, slightly enlarged, showed the cortex extensively replaced by coalescing caseous tubercles; another contained one miliary caseous tubercle.

Inguinal Glands.—A right inguinal gland was much enlarged, caseous and softened throughout.

On the left side two contained three pin-head sized caseous tubercles.

Pectoral Glands.—The pectoral glands on each side were closely beset with miliary caseous tubercles.

Thorax.

There was no fluid in the pleural cavities. The right caudal lobe of the lung was adherent to an enlarged vertebral gland.

Pleura.—The parietal pleura for a short distance around the enlarged vertebral glands (see below) presented an eruption of yellow caseous tubercles, and there were two small groups of aggregated tubercles on the right side of the diaphragm.

Lungs.—The lungs showed several small patches of collapse, and were closely beset with discrete firm yellow caseous tubercles varying in size from 1 up to 5 mm. in diameter, the majority however varying from 1 to 2 mm. The right middle lobe was completely consolidated, and more than half was dense yellow and caseous.

The apex of the right cephalic lobe contained a firm caseous nodule 1 cm. in diameter, and the ventral tip of the left cephalic lobe was solid and caseating.

Thoracic Glands.—The bronchial glands were enlarged, oedematous, and contained scattered discrete caseous tubercles up to 2 mm.

The right sternal glands (two), slightly enlarged and oedematous, contained discrete caseous tubercles.

Vertebral Glands.—The vertebral glands on the right side in the 8th to the 10th interspaces were much enlarged, the largest measuring nearly 1·5 cm. in diameter, and were yellow, caseous and softened throughout. On the left side two small glands showed a few pin-head sized caseous tubercles.

Heart (muscle and valves).—Normal.

There was a slight excess of fluid in the pericardium.

Abdomen.

The peritoneal cavity contained a large excess of clear yellow serous fluid.

Omentum and Peritoneum.—The omentum contained numerous tubercles ranging in size from about 0·5 to a little over 1 mm. in diameter; the large ones were yellow and caseous, the smaller ones grey and translucent with opaque centres. The omentum was adherent to the spleen and the caecum and at these places the tubercles were very numerous and closely aggregated together. The parietal peritoneum showed in the dorsal region a few groups of caseous tubercles, and on the tendon of the diaphragm numerous caseous tubercles, in places confluent. The mesocolon showed sparsely scattered tubercles similar to those on the omentum.

Numerous delicate strands of fibrin stretched from the abdominal viscera to the parietal wall.

Spleen.—The spleen was slightly adherent to the ribs, and was much enlarged; it was triangular in outline and measured 5·5 by 4·5 by 1·8 cm. The pulp was very closely beset with soft yellow caseous nodules varying in size up to about 5 mm. in diameter, those situated just under the capsule causing yellow prominences on the surface.

Splenic Glands.—Two were slightly enlarged and contained discrete caseous miliary tubercles.

Liver.—The liver was closely beset with caseous nodules varying in size from a mere point up to about 3 mm. in diameter; the smaller tubercles were whitish in colour, the larger ones were yellow and many were softened.

On the capsule of the liver there were fairly numerous small grey translucent tubercles.

Portal Gland.—The portal gland was enlarged and moderately closely beset with discrete yellow miliary caseous tubercles.

Coeliac and Pancreatic Glands.—These glands were similarly affected.

Kidneys.—Each kidney showed in the cortex a number of yellow caseous tubercles, the largest about 1·5 mm. in diameter. Twenty were counted in the left, and there was a rather smaller number in the right. In the medulla of the left kidney there was a large caseous tubercle and in that of the right two or three minute grey tubercles.

Suprarenal Bodies.—In the cortex of the left suprarenal body there was a pin-head sized yellow caseous tubercle. The right suprarenal body was normal.

Iliac and Lumbar Glands.—A right iliac gland contained two pin-head sized caseous tubercles.

One lumbar gland was slightly enlarged, partly caseous and softened; two others contained one or two miliary caseous tubercles.

Alimentary Tract.

Tongue, Pharynx.—Normal.

Cervical, Pharyngeal, and Submaxillary Glands.—These glands appeared normal.

Left Submental Gland.—This gland contained a small group of caseous tubercles.

Intestines.—In the ileum there was one submucous caseous nodule; a Peyer's patch a few inches from the ileo-caecal valve was thickened and caseous and showed a small ulcer on the mucous surface and several projecting caseous tubercles on the serous.

The large intestine was normal.

Pyloric, Mesenteric, and Ileo-colic Glands. — A pyloric gland and two mesenteric glands were slightly enlarged and contained numerous discrete caseous tubercles. A third mesenteric gland contained two pin-head sized caseous tubercles. The rest of the mesenteric and the ileo-colic glands were normal.

Colic Glands.—One colic gland contained a miliary caseous tubercle; the rest were normal.

Brain.—Normal.

Testicles.—Normal.

Microscopic Examination.

Tubercle from Suprarenal.—Tubercle bacilli.

RHESUS MONKEY 89. Virus H. 74. "D.S."

Subcutaneous inoculation of culture derived from the human lung through G.P. 2004.

Dose—1·0 milligramme.

Date of Inoculation—February 21, 1907. [Age probably not more than six months.]

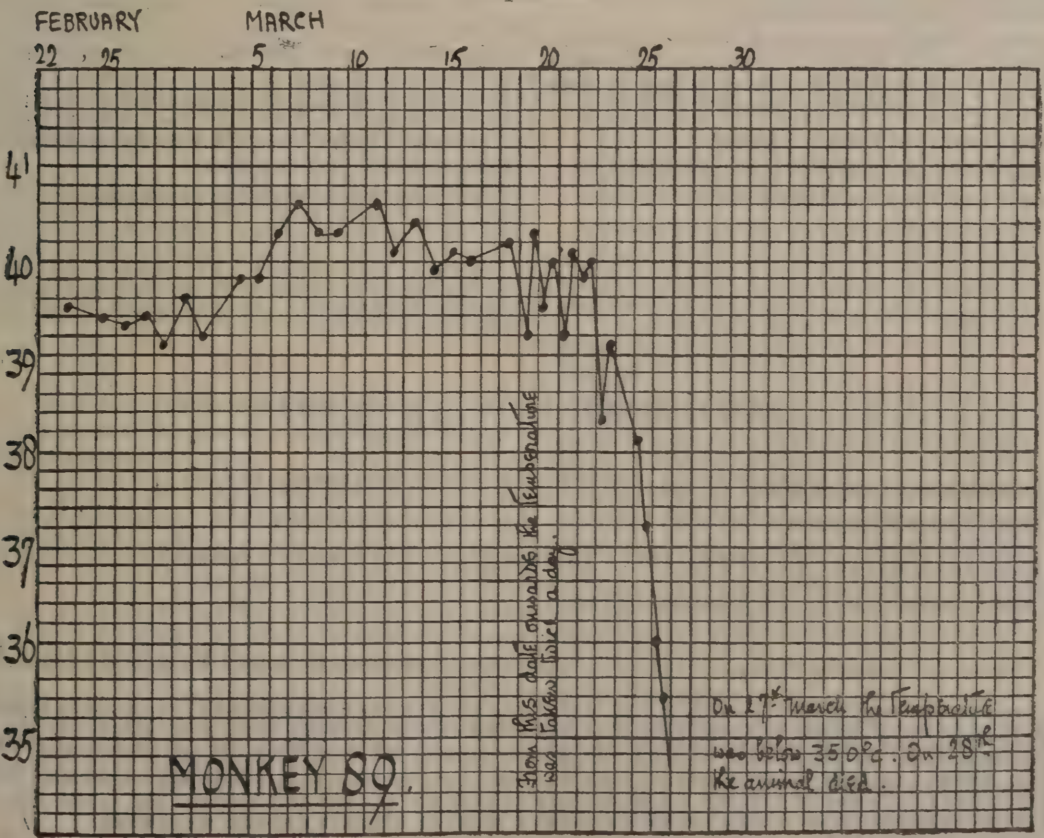
Died—March 28, 1907. [35 days after inoculation.]

Clinical Notes.

A soft fluctuating swelling developed at the seat of inoculation between the shoulders; on March 20 this was the size of a small hen's egg. The axillary glands were not appreciably enlarged. The monkey was first noticed to be ill about March 24, the signs being a staring coat and depressed appearance; the eyelids were oedematous and the animal seemed to be losing flesh.

It rapidly grew worse and was found dead on the afternoon of March 28.

Temperature.



From this date onwards the temperature was taken twice a day.

On 27th March the temperature was below 35.0°C. On 28th the animal died.

POST-MORTEM EXAMINATION.

General Condition.—Thin.

Local Lesion.—In the subcutaneous tissue of the back, over the right scapula, there was a soft prominent fluctuant tumour measuring 4 by 4 by about 2 cm., which on section was found to be a cyst filled with soft caseo-pus. The skin over it was adherent, and showed a small ulcer, probably the site of the inoculation puncture, through which caseo-pus could be expressed.

Axillary Glands.—On the right side, one, 1·5 cm. in greatest diameter, showed about a third of the substance caseous and softened. A smaller gland showed some discrete tubercles in the cortex, whilst in another still smaller gland there was one miliary tubercle ; the rest of the glands, perhaps slightly enlarged, were free from visible tubercles.

On the left side one gland, 1·3 cm. in greatest diameter, showed in the centre a small irregular caseous patch and a few discrete caseous tubercles.

Other glands in this group appeared normal.

Cervical Glands.—On the right side one of the lower cervical glands near the acromial end of the clavicle, 1·3 cm. in diameter, showed about two-thirds of its substance caseous and softened.

Two deeper larger glands, under the trapezius, were caseous practically throughout.

One of the lower cervical glands on the left side, the size of a kidney bean, was caseous and softened almost throughout ; another smaller gland was partly caseous ; the rest of the cervical glands appeared normal.

Thorax.

There was no fluid in the pleural cavities.

Lungs.—The lungs were crepitant, except for some patches of collapse in the ventral portions of the anterior lobes. The lung parenchyma contained very sparsely scattered miliary tubercles with caseous centres and grey margins.

The right lung was adherent on its dorsal margin to the parietal pleura situated over the enlarged vertebral gland.

Thoracic Glands.—The bronchial glands were not apparently enlarged ; two of the praetracheo-bronchial glands contained each one miliary caseous tubercle. An intertracheo - bronchial gland contained three miliary caseous tubercles. The right ventral mediastinal gland was slightly enlarged congested and contained a few small caseous tubercles.

Vertebral Glands.—A vertebral gland in the sixth interspace, 1 cm. in diameter, was caseous and softened throughout. Several other vertebral glands were slightly enlarged but were not caseous.

Heart (muscle and valves).—Normal.

There was an excess of fluid in the pericardial sac.

Larynx and Trachea.—Normal.

Abdomen.

There was no excess of fluid in the peritoneal cavity.

Omentum and Peritoneum.—Normal.

Spleen.—The spleen was slightly enlarged, measuring 5 by 3 by 1·3 cm., and contained numerous discrete caseous tubercles with narrow grey margins, ranging in size from about 0·5 to a little over 2 mm. in diameter. The larger tubercles were softened, and those immediately beneath the capsule projected slightly from the surface.

The splenic lymphatic glands were normal.

Liver.—The liver contained numerous evenly distributed caseous tubercles, ranging from 0·5 to about 2 mm. in diameter.

Portal Gland.—The portal gland was enlarged and contained fairly numerous discrete caseous tubercles, the largest 1·5 mm. in diameter.

Pancreatic and Coeliac Glands.—Several of the pancreatic glands and a coeliac gland were slightly enlarged and contained similar caseous tubercles.

Kidneys.—The right kidney showed in the cortex three or four grey miliary caseating tubercles.

One miliary caseous tubercle was seen on the surface of the left kidney ; there was none in the depth.

Suprarenal Bodies.—Normal.

Lumbar and Iliac Glands.—One lumbar gland contained a caseous tubercle. There was a softened caseous nodule 2 mm. in diameter in a right iliac gland, and a miliary caseous tubercle in one of the glands on the left side.

Alimentary Tract.

Pharynx, Tonsils.—Normal.

Submaxillary and Submental Glands.—Normal.

Intestines.—The small intestine was normal.

In the caecum, about one inch from the ileo-caecal valve, was a congested ulcer 5 mm. in diameter with raised undermined margins and soft yellow caseous floor.

Gastric Glands.—A gland in the small omentum, near the pylorus, was slightly enlarged and showed a number of discrete miliary caseous tubercles. Other gastric glands appeared normal.

Mesenteric Glands.—The mesenteric glands appeared slightly swollen, but were otherwise normal.

Colic Glands.—Normal.

Inguinal Glands.—Normal.

Microscopic Examination.

Caseous Material from Ulcer in Large Intestine.—Tubercle bacilli very numerous.

Bronchial Gland.—Tubercle bacilli numerous.

RHESUS MONKEY 91. Virus H. 74. "D.S."

Subcutaneous inoculation of culture derived from the human lung through G.P. 2004.

Dose—10·0 milligrammes.

Date of Inoculation—February 21, 1907. [Age probably not more than six months.]

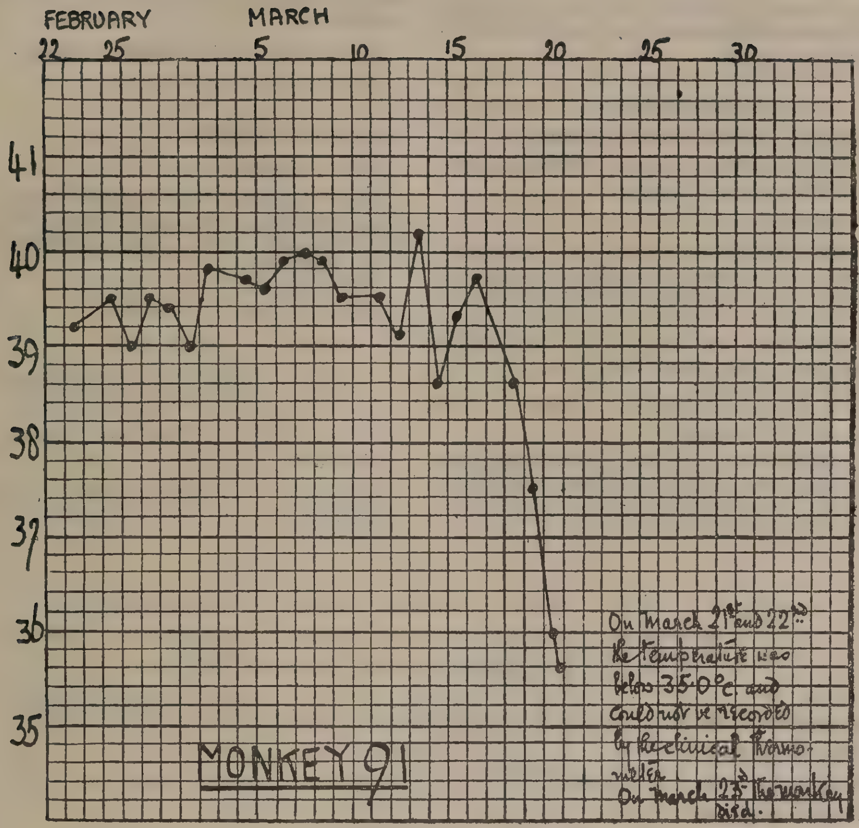
Died—March 23, 1907. [30 days after inoculation.]

Clinical Notes.

A small soft tumour developed at the seat of inoculation between the shoulders, and the axillary glands became appreciably enlarged. On the 27th day the tumour measured about 3 cm. in diameter ; there was a small scab at the point of entry of the needle, and on the hair over the tumour some dried discharge which had probably exuded through the inoculation puncture.

The monkey first appeared to be ill about March 9, and became gradually worse until March 16. On the following day the temperature had fallen to 38·6° C. and the monkey was very ill. The temperature then fell to below 35° C., and the monkey was found dead on March 23, the 30th day after inoculation.

Temperature.



POST-MORTEM EXAMINATION.

The carcass was emaciated.

Local Lesion.—In the subcutaneous tissue of the back, just below the right scapula, there was a hemispherical cystic swelling measuring 4 by 4 by 2 cm., the skin over which was thin and on the point of breaking down. On section the swelling was a cyst, with a wall of yellow caseous substance, 1 to 2 mm. thick, ragged and soft on the internal surface, and with thin caseo-purulent contents.

Axillary Glands.—On the right side there were two glands, each about the size of a broad bean; one was dense yellow and caseous throughout, the other was three quarters caseous. There were besides several smaller glands; one the size of a small pea was caseous throughout, another showed part of the cortex caseous.

On the left side two glands, the largest the size of a pea, showed about three quarters of the substance replaced by yellow caseous nodules.

Cervical Glands.—Two right lower cervical glands contained each a softened caseous nodule the size of a hemp seed. Other cervical glands appeared normal.

Thorax.

There was no fluid in the pleural cavities.

Pleura.—The parietal pleura showed one pin-head sized caseous tubercle.

Lungs.—The lungs, on opening the chest, were found to be collapsed and free from adhesion; the right lung was extensively hepatized, the upper and right middle lobes being firm red and almost entirely airless. The left lobes were more diffusely collapsed and consolidated. The parenchyma of the lungs contained sparsely scattered firm yellow caseous tubercles ranging in size from 1 to 2 mm. in diameter. There were altogether about three dozen tubercles in both lungs.

Thoracic Glands.—The bronchial glands were congested and slightly enlarged; each contained one or two miliary caseous tubercles.

The ventral mediastinal glands were enlarged and closely beset with more or less discrete firm yellow caseous tubercles, the largest rather larger than a millet seed.

The vertebral glands on the right side in the eighth, ninth, and tenth interspaces were enlarged, the largest being the size of a pea, and were firm yellow and caseous throughout.

On the left side, opposite the ninth interspace, there was a gland the size of a hemp seed which was also caseous throughout.

Heart.—Normal.

Larynx and Trachea.—Normal.

Abdomen.

The peritoneal cavity contained about 10·0 cc. of clear fluid.

Omentum.—The omentum showed numerous grey translucent tubercles up to a millet seed in size occurring chiefly in small groups.

Peritoneum. — There were a few small caseous tubercles on the peritoneum covering the diaphragm on the right side, and one or two on the parietal peritoneum over the floor of the abdomen.

The meso-colon showed rather numerous minute transparent granules; there was one miliary caseous tubercle on the mesentery.

Liver.—The liver was slightly enlarged, pale in colour, and very closely beset with opaque creamy white tubercles ranging in size from a mere point up to about 1·5 mm. in diameter.

Portal Gland.—The portal gland was enlarged and showed around the cortex closely set firm yellowish-white tubercles, the largest 2 mm. in diameter.

Spleen.—The spleen was about twice the normal in size and measured 5·5 by 3 by 1·5 cm. It was firm and closely beset with caseous tubercles similar to those in the liver.

A splenic lymph gland contained a pin-head sized caseous tubercle.

Kidneys.—The left kidney showed on the surface two minute opaque greyish white tubercles and in the depth of the cortex a greyish white tubercle the size of a millet seed. The cortex of the right kidney showed four yellow caseous tubercles, one on the surface and three in the depth, the largest 1 mm. in diameter.

Suprarenal Bodies.—Normal.

Coeliac and Lumbar Glands.—One coeliac and one lumbar gland each contained a miliary caseous tubercle.

Iliac Glands.—Normal.

Alimentary Tract.

Tongue, Pharynx, Palate, Tonsils.—Normal.

Submental Glands.—These glands contained altogether four miliary caseous tubercles.

Stomach.—Normal.

Intestines.—The Peyer's patches in the ileum contained altogether six miliary tubercles. The mucous membrane around and over them was deeply congested but not ulcerated.

In the colon there was one submucous caseous tubercle, the mucous membrane over which was congested and slightly ulcerated.

There was a submucous caseous tubercle in the rectum which was not ulcerated.

Gastric Glands. — A lymphatic gland near the pylorus contained about a half a dozen firm yellow caseous tubercles, the largest the size of a millet seed.

Other gastric glands were normal.

Mesenteric Glands.—The mesenteric glands contained altogether about half a dozen miliary caseous tubercles.

Ileo-colic and Colic Glands.—Normal.

Testicles.—Normal.

Brain.—Normal.

Bone Marrow.—The marrow of the ribs showed moderately numerous yellow caseous tubercles ; similar tubercles were seen in the cancellous tissue of the bones of the skull.

Inguinal Glands.—Normal.

Microscopic Examination.

Tubercle from Ileum. — Tubercle bacilli very numerous.

Tubercle from Rib - Marrow. — Tubercle bacilli numerous.

CAT 19. [Kitten.] Virus H. 74. "D.S."

Subcutaneous inoculation of culture derived from the lung through Guinea-pig 2004.

Dose—1·0 milligramme.

Date of Inoculation—February 21, 1907.

Weight—400 grammes.

Died—February 28, 1907. [Seven days after inoculation.]

POST-MORTEM EXAMINATION.

Local Lesion.—At the seat of inoculation in the subcutaneous tissues of the abdomen there was a small caseous lesion.

There was no tuberculosis elsewhere in the body.

The cause of death was not determined.

CAT 21. [Kitten.] Virus H. 74. "D.S."

Subcutaneous inoculation of culture derived from the lung through Guinea-pig 2004.

Dose—0·1 milligramme.

Date of Inoculation—February 21, 1907.

Weight—380 grammes.

Died—February 23, 1907. [Two days after inoculation.]

POST-MORTEM EXAMINATION.

In the lungs there were pneumonic patches.

There was no sign of tuberculosis in any of the organs or glands.

CAT 23. [Kitten.] Virus H. 74. "D.S."

Subcutaneous inoculation of culture derived from the lung through Guinea-pig 2004.

Dose—0·01 milligramme.

Date of Inoculation—February 21, 1907.

Died—May 4, 1907. [72 days after inoculation.]

Weights.

	grammes.
February 21, 1907	500
May 4, 1907	500

POST-MORTEM EXAMINATION.

Local Lesion.—In the subcutaneous tissues of the abdomen there were three or four flattened firm caseating nodules close together, none exceeding 5 mm. in diameter.

Inguinal and Axillary Glands.—Normal.

Peritoneum, Spleen, Kidneys, Suprarenal Bodies.—Normal.

Liver.—The liver substance was beset with numerous evenly distributed greyish white translucent tubercles up to a pin's head in size.

Abdominal Lymphatic Glands.—Normal.

Lungs.—The lungs were pinkish and crepitant, and free from visible tubercles.

Pleura, Thoracic Lymphatic Glands, Heart.—Normal

Microscopical Examination.

Tubercle from Liver.—No tubercle bacilli.

VIRUS H. 75. "A.H."

PRIMARY ABDOMINAL TUBERCULOSIS.

VIRUS H. 75. "A.H."

(November 29, 1906.)

CULTURE INOCULATIONS.

PERITONEAL FLUID, MARCH 19, 1907.

The strain was derived from the original material through Guinea-pig 2018, and had been in cultivation a total period of 99 days.

The culture used was the 7th generation, 21 days old.

CALF 1195.

Subcutaneous.
Dose : 50·0 mg.
Killed : June 24, 1907.
97 days.

P.M.—At the seat of inoculation there was a cystic tumour. The left prescapular gland contained three fibro-calcareo-caseous nodules. There was no tuberculosis elsewhere.

CATS.

Number.	Method.	Dose.	Duration of Life.	Result.
31	Intrap.	10·0 mg.	D. 94 days	T. of lungs only. Cause of death not determined.
33	Subcut.	10·0 mg.	K. 98 „	Local T. only.
35	Fed.	10·0 mg.	K. 98 „	Healthy throughout.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1205	Intrav.	1·0 mg.	K. 101 days	G. T.
1206	Intrav.	0·1 mg.	K. 101 „	Slight T. of lungs and kidneys.
1207	Intrap.	10·0 mg.	D. 92 „	G. T.
1208	Subcut.	10·0 mg.	K. 101 „	Local T. and slight T. of lungs.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
2305	Intrap.	1·0 mg.	D. 14 days	G. T. Injection partly intramuscular.
2308	Intrap.	0·1 mg.	D. 26 „	G. T.
2306	Subcut.	1·0 mg.	D. 49 „	G. T.
2307	Subcut.	0·1 mg.	D. 22 „	G. T. Injection partly intraperitoneal.

LUNG. AUGUST 9, 1907.

The strain was derived from the original material through Guinea-pig 2459, and had been in cultivation a total period of 47 days.

The culture used was the 4th generation, 21 days old.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1431	Intrav.	1·0 mg.	D. 13 days	Early G. T. ? cause of death.
1432	Intrav.	0·1 mg.	D. 66 „	T. of lungs, kidneys, and one sternal gland.
1433	Subcut.	10·0 mg.	K. 192 „	Local T. and two tubercles in the lungs.
1434	Subcut.	10·0 mg.	K. 192 „	Slight chronic G. T.

CALF 1195. Virus H. 75. "A.H."

Subcutaneous inoculation of culture derived from human peritoneal fluid, through G.P. 2018.

Dose—50·0 milligrammes.

Date of Inoculation—March 19, 1907. [Age about 15 weeks.]

Killed when in good health—June 24, 1907. [97 days after inoculation.]

Clinical Notes.

A month after the inoculation on the left side of the neck there was a firm local tumour measuring 13 by 6 cm., thin and tapering at the inferior extremity. The prescapular gland was slightly enlarged, about 6 cm. in length. The calf was in good health.

Two months after inoculation the tumour was small and tense, measuring 8 by 5 cm., with a narrow band-like prolongation from its inferior extremity. The gland was about twice the normal in size. The calf was quite well.

No further changes were recorded in the local conditions; the calf remained well until it was killed.

Temperature.

During the first 20 days the temperature was slightly irregular (maximum 39·7° C.). Subsequently it was normal, with the exception of two sudden and unexplained rises to 40·2 and 40·3° C., on the 28th and 87th days respectively.

Tuberculin Test.

The calf was not tested subsequent to inoculation.

Weights.

	cwt.	qrs.	lbs.
March 19, 1907	1	1	7
June 24, 1907	1	3	5

Total gain of weight during experiment.—1 qr. 26 lbs.

Average rate of gain per week.—4 lbs.

POST-MORTEM EXAMINATION.

Carcass.—In good condition.

Local Lesion.—At the seat of inoculation on the left side of the neck there was a cyst the size of a goose's egg, with a fibrous wall 3 mm. in thickness lined internally with granulation tissue; it was filled with yellow tenacious caseo-pus in which gritty particles could be detected; the skin was adherent to the cyst wall and was slightly thickened.

Left Prescapular Gland.—The left prescapular gland measured 4·5 by 3 by 1·5 cm. and contained three fibro-calcareo-caseous nodules 1·5, 1·0 and 0·5 cm. in diameter respectively.

Right Prescapular Gland.—The right prescapular gland measured 4 by 2·2 by 1 cm. and was normal on section.

Prepectoral aud Axillary Glands.—Normal.

Thorax.

Pleura, Lungs, Thoracic Glands, Heart.—Normal.

Abdomen.

Peritoneum, Omentum, Liver, Portal Glands, Spleen, Kidneys, Suprarenals.—Normal.

Alimentary Tract.

Tongue, Pharynx, Palate, Tonsils, Intestines, Mesenteric Glands.—Normal.

Various Lymphatic Glands.

Precrural, Popliteal, Gluteal, Ischiatic, Renal Lumbar, Iliac, Pudic, Pharyngeal, Submaxillary Hyoid, and Parotideal.—Normal.

CAT 31. Virus H. 75. "A.H."

Intraperitoneal inoculation of culture derived from the peritoneal fluid through G.P. 2018.

Dose—10·0 milligrammes.

Date of Inoculation—March 19, 1907.

Died—June 21, 1907. [94 days after inoculation]

Weights.

	grammes.
March 19, 1907	2050
June 21, 1907	1170

Total loss of weight.—880 grammes.

POST-MORTEM EXAMINATION.

The body was very thin.

Omentum.—The omentum contained no fat, and showed no sign of tuberculosis.

Peritoneum.—Normal.

No tubercles were seen in the *spleen, liver, kidneys,* or *suprarenal bodies.*

All the *abdominal and thoracic lymphatic glands* were normal.

Lungs.—The lungs on opening the chest were expanded, but collapsed on removal. They showed on the surface just under the pleura numerous greyish yellow nodules varying in size and outline; some were circular, measuring up to 4 mm., while others were much elongated; along the dorsal border of each caudal lobe there was a greyish yellow band 5 mm. in greatest width; on section the nodules and tuberculous patches were flattened, and penetrated only a short distance into the substance of the lung; on section similar nodules were seen in the depth of the lung, but these were not so numerous nor so large as on the surface.

Microscopical Examination.

Tubercle from Lung.—A few tubercle bacilli, short and thick.

CAT 33. Virus H. 75. "A.H."

Subcutaneous inoculation of culture derived from the peritoneal fluid through G.P. 2018.

Dose—10·0 milligrammes.

Date of Inoculation—March 19, 1907.

Killed when in good health—June 25, 1907. [98 days after inoculation.]

Weights.

	grammes.
March 19, 1907	1750
June 25, 1907	1850

Total gain of weight.—100 grammes.

POST-MORTEM EXAMINATION.

Local Lesion.—In the subcutaneous tissues of the abdominal wall there was a small flat patch of fibrous tissue beset with small caseous nodules, some softened; there was no ulceration.

Inguinal Glands.—A small inguinal gland (the size of a hemp seed) on the right side was caseous in the centre.

Other inguinal glands were normal.

Pudic and Iliac Glands.—Normal.

Kidneys.—One kidney showed on the surface a grey focus which extended into the cortex as a grey streak

Other organs and glands were normal.

Microscopical Examination.

Right Inguinal Gland.—Tubercle bacilli numerous.

CAT 35. Virus H. 75. "A.H."

Fed with culture derived from the peritoneal fluid through G.P. 2018.

Dose—10·0 milligrammes.

Date of Inoculation—March 19, 1907.

Killed when in good health—June 25, 1907. [98 days after inoculation.]

Weights.

	grammes.
March 19, 1907	1550
June 25, 1907	1420

Total loss of weight.—130 grammes.

POST-MORTEM EXAMINATION.

All the organs and glands were examined and the cat was found to be free from tuberculosis.

VIRUS H. 76. "G.M."

TUBERCULOSIS OF KNEEJOINT.

VIRUS H. 76. "G.M."

(January 15, 1908.)

KNEEJOINT.

CULTURE INOCULATIONS

MARCH 20, 1908.

The strain was derived from the human synovial membrane through Guinea-pig 2887, and had been 38 days in artificial cultivation.

The culture used was the 3rd generation, 15 days old.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
3012	Intrap.	1·0 mg.	D. 13 days	G.T.
3013	Subcut.	1·0 mg.	D. 3 „	No T.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1780	Intrav.	1·0 mg.	D. 44 days	G. T.
1781	Intrav.	0·01 mg.	D. 7 „	No T.
1782	Subcut.	50·0 mg.	K. 175 „	Local lesion. Slight T. of lungs and kidneys.
1783	Subcut.	10·0 mg.	K. 175 „	Local T. and slight T. of lungs.

SEPTEMBER 22, 1908.

The strain was derived from the human synovial membrane through Guinea-pig 2887, and had been 224 days in artificial cultivation.

The culture used was the 9th generation, 10 days old.

RHESUS MONKEY 227.

Subcutaneous.
Dose : 1·0 mg.
Died : October 22, 1908.
30 days.
P.M.—General tuberculosis.

RHESUS MONKEY 229.

Subcutaneous.
Dose : 1·0 mg.
Died : October 22, 1908.
30 days.
P.M.—General tuberculosis.

GOAT 75.

Fed.
Dose : 74·0 mg.
Killed : August 16, 1909.
328 days.
P.M.—Very slight tuberculosis of the glands of the alimentary tract and of one portal gland. No tuberculosis elsewhere.

RHESUS MONKEY 227. Virus H. 76. "G.M."

(A young animal.)

Subcutaneous inoculation of culture derived from the original material through Guinea-pig 2887.

Dose—1·0 milligramme.

Date of Inoculation—September 22, 1908.

Died.—October 22, 1908. [30 days after inoculation.]

Clinical Notes.

The course of the disease was like that usually seen in monkeys suffering from acute tuberculosis.

The weight at death was 1370 grammes.

POST-MORTEM EXAMINATION.

The carcass was emaciated.

Local Lesion.—Over the right scapula there was an oval ulcer measuring 3 by 2·5 cm. with undermined margins, the floor of which was covered with a thin layer of caseo-pus. The base was formed by the muscles which were infiltrated with caseous tubercles.

Axillary Glands.—Two on the right side 1·2 cm. in diameter were caseous and softened throughout. Two smaller glands showed caseous nodules in the cortex.

On the left side one contained several small caseous tubercles.

Cervical Glands.—Behind the clavicle on the right side there were two softened and caseous glands the size of peas and three which contained more or less discrete caseous tubercles.

An upper cervical gland on each side contained one or two caseous tubercles.

Vertebral Glands.—A vertebral gland in the 8th interspace on the right side the size of a hemp seed was caseous throughout. Other vertebral glands were normal.

Thorax.

Lungs.—The lungs were pink and crepitant and showed the ventral portions of the small middle lobes on each side slightly congested. They contained sparsely scattered caseous tubercles with narrow grey margins, the largest 1·5 mm. in diameter. There were about a dozen on the surface of the left lung and only three or four on that of the right.

Thoracic Glands.—The left praetracheo-bronchial gland contained one caseous tubercle, the right was normal. The left interbronchial gland was slightly enlarged and partly caseous. The right contained two or three minute caseous tubercles.

Pleura.—Normal.

Pericardium.—The pericardium was filled with clear fluid.

Heart Muscles and Valves.—Normal.

Abdomen.

Omentum.—The omentum showed scattered submiliary caseous tubercles.

There were a few small caseous tubercles on the mesocolon, none on the mesentery.

Spleen.—The spleen was slightly enlarged, measuring 5 by 3 by 1·5 cm. and was closely beset with caseous tubercles varying in size from a mere point up to about 1·5 mm. in diameter.

The splenic lymphatic glands were slightly enlarged and each contained one or two caseous tubercles.

Liver.—The liver was slightly enlarged, the substance was pale and very closely beset with opaque whitish (the larger faintly creamy) caseous tubercles ranging in size from a mere point up to that of a millet seed.

The gland on the head of the pancreas was enlarged and showed its cortex extensively replaced by caseous softened nodules.

The pyloric gland was slightly enlarged and partly caseous and softened.

Kidneys.—Each kidney showed in the cortex scattered caseous tubercles, the largest a millimetre in diameter.

Suprarenal Bodies.—Normal.

Lumbar Glands.—The lumbar glands were slightly enlarged and showed softened caseous nodules in the cortex.

Iliac Glands.—The iliac glands contained a few minute caseous tubercles.

Alimentary Tract.

Tongue and Tonsils.—Normal.

The mucous membrane of the larynx and pharynx was congested, no tubercles were seen.

Submaxillary Glands.—The submaxillary glands contained more or less discrete caseous tubercles.

Retro-pharyngeal Glands.—Each pharyngeal gland contained one or two minute caseous tubercles.

Intestines.—There were two or three small caseous tubercles under the mucous membrane of the small intestine. The large intestine appeared normal.

Mesenteric Glands.—The mesenteric glands were not obviously enlarged, they contained a moderate number of discrete caseous tubercles.

Ileo-colic and Colic Glands.—The ileo-colic and colic glands appeared normal.

Inguinal Glands.—The inguinal glands each contained several miliary caseous tubercles.

RHESUS MONKEY 229. Virus H. 76. "G.M."

(A young animal.)

Subcutaneous inoculation of culture derived from the original material through Guinea-pig 2887.

Dose—1·0 milligramme.

Date of Inoculation—September 22, 1908.

Died—October 22, 1908. [30 days after inoculation.]

Clinical Notes.

The course of the disease was marked by extreme weakness and emaciation and was similar to that usually seen in monkeys suffering from acute tuberculosis.

The weight at death was 1,300 grammes.

POST-MORTEM EXAMINATION.

The carcass was very emaciated.

Local Lesion.—The skin in the angle between the scapula and the humerus showed an ulcer measuring 2 by 1·5 cm., with irregularly thickened raised undermined margins, and smooth congested floor covered with a layer of caseo-pus.

The muscles under the ulcer were beset with caseous nodules up to a hemp seed in size.

Axillary Glands.—On the right side there was a group of eight enlarged glands. One, a centimetre in diameter, contained a softened caseous nodule replacing half its substance, and a number of discrete miliary caseous tubercles. The other seven, the largest about a centimetre in diameter, were all practically caseous throughout.

On the left side two slightly enlarged glands contained miliary caseous tubercles.

Cervical Glands.—On the right side, one behind the right clavicle contained a pinhead-sized caseous tubercle. One on the left side was similarly affected. An upper cervical gland on the right side contained two millet-seed-sized caseous nodules.

Vertebral Glands.—Normal.

Thorax.

Lungs.—The lungs were pink and crepitant throughout. In the right caudal lobe there were two tubercles, one grey and translucent, the other the size of a millet seed yellow and caseous. No tubercles were seen in the other lobes.

Thoracic Glands.—The bronchial glands were slightly enlarged, each contained a few small caseous and softened nodules. The ventral mediastinal gland on the right side, the size of a pea, had its cortex closely beset with caseous softened tubercles.

Heart and Pleura.—Normal

Larynx and Trachea.—Normal.

Abdomen.

Omentum.—The omentum showed fairly numerous very minute grey foci and a few submiliary caseous tubercles.

Peritoneum.—Normal.

Spleen.—The spleen was slightly enlarged (measuring 5 by 2·5 by 1 cm.) and was closely beset with softened caseous tubercles, the largest rather more than 1·5 mm. in diameter.

The splenic lymphatic glands, two in number, contained each a few yellow caseous tubercles.

Liver.—The liver was slightly enlarged and moderately closely beset with caseous tubercles ranging in size from a mere point up to that of a millet seed.

There was a small caseous gland on the neck of the gall-bladder.

Two glands on the head of the pancreas were enlarged and showed their cortices practically entirely replaced by softened and caseous nodules.

A gland near the cardiac end of the stomach and one near the pylorus were enlarged and caseous almost throughout.

Kidneys.—The left kidney showed in the cortex, just under the capsule, three caseous tubercles the largest the size of a millet seed. One tubercle was seen on section.

There was one millet-seed sized tubercle in the medulla of the right kidney and one in the cortex.

Suprarenal Bodies.—Normal.

Iliac and Ilio-sacral Glands.—One iliac gland contained a pinhead-sized caseous tubercle, and an ilio-sacral gland one millet-seed-sized caseous tubercle.

Lumbar Glands.—Two lumbar glands each showed several softened caseous nodules in the cortex.

Alimentary Tract.

Tongue, Pharynx, Tonsils.—Normal.

Retro-pharyngeal Glands.—In each pharyngeal gland there were two caseous tubercles.

Submaxillary Glands.—Two submaxillary glands on the right side contained each one caseous tubercle.

Four glands on the left side contained altogether nine caseous tubercles.

Intestines.—Normal.

The Mesenteric, Ileo-colic, and Colic Glands appeared normal.

Inguinal Glands.—One of the inguinal glands on the left side contained half-a-dozen miliary caseous tubercles. Two others each contained one tubercle.

The right inguinal glands were normal.

Brain.—Normal.

Microscopical Examination.

Tubercle from Spleen.—Tubercle bacilli numerous.

Tubercle from Liver.—Tubercle bacilli numerous.

GOAT 75. Virus H. 76. "G.M."

(Young adult female.)

Fed once with culture derived from the original material through Guinea-pig 2887.

Dose—74·0 milligrammes.

Date of Feeding—September 22, 1908.

Killed when in good health—August 16, 1909. [328 days after feeding.]

ABSTRACT OF POST-MORTEM NOTES.

(For full details *see* Report on the Excretion of Tubercle Bacilli in Milk.)

The left submaxillary, the right retro-pharyngeal, and the left parotideal gland each contained three or four small calcareous tubercles or calcareous grains.

Two mesenteric glands were affected, one containing a calcareous patch and calcareous tubercles, the other a single calcareo-caseous tubercle.

Three ileo-colic glands contained calcareo-caseous patches, three contained each a calcareo-caseous nodule or two, and one was normal.

One portal gland showed a calcareo-caseous nodule and a calcareous tubercle.

There was no tuberculosis elsewhere.

VIRUS H. 77. "R.L."

PRIMARY ABDOMINAL TUBERCULOSIS.

VIRUS H. 77. "R.L."

(December 11, 1906.)

CULTURE INOCULATIONS.

MESENTERIC GLANDS.

April 11, 1907.

The strain was derived from the human mesenteric glands (direct), and had been in artificial cultivation a total period of 121 days.

The culture used was the 6th generation, 21 days old, on bovine serum.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1245	Intrav.	1·0 mg.	D. 20 days	G. T.
1246	Intrav.	0·1 mg.	D. 23 ,,	G. T.
1247	Intrap.	1·0 mg.	D. 7 ,,	Early T. of peritoneum. Death apparently due to condition of intestines and mesenteric glands.
1248	Intrap.	0·1 mg.	D. 22 ,,	G. T.
1249	Subcut.	10·0 mg.	D. 56 ,,	G. T.
1250	Subcut.	1·0 mg.	D. 84 ,,	G. T.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
2338	Intrap.	0·1 mg.	D. 20 days	G. T.
2339	Subcut.	0·1 mg.	D. 55 ,,	G. T.

MESENTERIC GLANDS.

December 7, 1907.

The strain was derived from the human mesenteric glands direct, and had been in artificial cultivation a period of one year (361 days).

The culture used was the 24th generation, 20 days old.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1584	Subcut.	10 0 mg.	D. 65 days	G. T.
1585	Subcut.	10·0 mg.	D. 66 ,,	G. T., with pseudo-tuberculosis of mesenteric glands.

CALF 1349.

Subcutaneous.
Dose : 50·0 mg.
Died : December 26, 1907.
19 days.

P.M.—Acute general tuberculosis.

CULTURE INOCULATIONS—*continued.*

LIVER.

MARCH 26, 1907.

The strain was derived from the human liver, through G.P. 2102, and had been in artificial cultivation a total period of 74 days.

The culture used was the 5th generation, 21 days old, on bovine serum.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1232	Intrav.	1·0 mg.	D. 17 days	G. T.
1233	Intrav.	0·1 mg.	D. 22 „	Acute G. T.
1234	Intrap.	1·0 mg.	D. 14 „	Acute G. T.
1235	Subcut.	10·0 mg.	D. 56 „	G. T.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
2331	Intrap.	0·1 mg.	D. 20 days	G. T.
2332	Intrap.	0·1 mg.	D. 12 „	G. T.

CALF 1349. Virus H. 77. "R.L."

Subcutaneous inoculation of culture derived from the human mesenteric glands.

Dose—50·0 milligrammes.

Date of Inoculation—December 7, 1907. [Age about 8 weeks.]

Died—December 26, 1907. [19 days after inoculation.]

Clinical Notes.

The course of the disease was similar to that usually seen in calves suffering from acute tuberculosis.

Temperature.

On the 5th day after inoculation the temperature rose to 40·0° C. It then fell to normal (38·7° C.) and quickly rose again; on the 10th day it was 40·2° C., on the 13th day 40·9° C., and on the 17th day 40·5° C.; this was the last recorded temperature.

Weights.

	qrs.	lbs.
December 7	2	15
December 26	2	11

Total loss of weight.—4 lbs.

Tuberculin Test.

The calf was not tested subsequent to inoculation.

POST-MORTEM EXAMINATION.

Local Lesion.—At the seat of inoculation on the left side of the neck there was a firm tumour measuring 8 by 8 by 2·5 cm. composed of yellow caseo-necrotic tissue which infiltrated both the skin and the muscles, in the latter a few discrete millet-seed sized yellow caseous tubercles were also seen.

Left Prescapular Gland.—The left prescapular gland measured 8 by 5 by 2·5 cm., and was composed practically throughout of dense yellowish white caseating tissue. The capsule of the gland was very slightly thickened.

Prepectoral Glands.—The round prepectoral gland on the left side measured 1·8 cm. in diameter and on section was firm and caseating almost throughout.

A prepectoral gland on the right side showed in its cortex two minute greyish-white tubercles.

Right Prescapular Gland.—The right prescapular gland measured 4 by 0·7 by 0·6 cm. and was normal throughout.

Cervical Glands.—In the cortex of a mid cervical gland on the left side there were three millet-seed sized caseous tubercles. No definite tubercles were seen in the other cervical glands.

Thorax.

Pleura.—Normal.

Lungs.—The lungs weighed 3 lb. 2 ozs.; the anterior lobes, almost the whole of the right caudal and the antero-ventral portions of the left caudal lobes were dark-red firm and quite airless; only the dorsal and posterior parts of the caudal lobes were air-containing, the left caudal lobe being very emphysematous.

The parenchyma of the lungs was thickly and evenly beset with minute grey tubercles, in places becoming confluent, the largest measuring not more than 1 mm. in diameter; here and there a larger yellow caseous tubercle was seen.

Thoracic Glands. — The dorsal mediastinal and bronchial glands were slightly enlarged and congested and on section the cortices showed grey tuberculous patches and foci without definite caseation.

Heart.—The endocardium of the right auricle showed about 16 small slightly raised greyish-white tubercles. One similar tubercle was seen on the endocardium of the right ventricle.

Larynx and Trachea.—The mucous membranes showed a few minute reddish-grey tubercles.

Abdomen.

Omentum.—On the omentum fifteen firm yellow caseous tubercles ranging from 1 to 2 mm. in diameter were counted.

Peritoneum.—The parietal peritoneum was normal.

Spleen.—The spleen appeared normal.

Liver.—On the surface of the liver under the capsule very numerous small grey tubercles were seen, 20 to 30 being counted in a square centimetre; there were also a few larger ones grey and translucent with opaque centres, 2 mm. in diameter. On section numerous small grey tubercles were seen evenly distributed throughout the substance of the liver.

Portal Glands.—The portal glands were slightly oedematous and showed in their cortices small opaque early tubercles.

Kidneys.—Each kidney showed on the surface fairly numerous grey tubercles the largest about 1 mm. in diameter; similar tubercles were seen in the depth of the cortex (about 20 being counted in each after longitudinal section).

Suprarenal Bodies.—In the cortex of the right suprarenal body there was one small greyish-white tubercle; in the left no definite tubercles were seen.

Renal Gland.—The renal gland contained two minute whitish tubercles.

Lumbar Glands.—Four lumbar glands each contained a moderate number of small caseous tubercles.

Iliac Glands.—Normal.

Coeliac Glands.—Two coeliac glands each contained two small caseous tubercles.

Alimentary Tract.

Tongue, Pharynx, Tonsils.—Normal.

Submaxillary Glands.—In the right submaxillary gland three small whitish tubercles were seen. The left was normal.

Retro-pharyngeal Glands.—No definite tubercles were seen.

Parotideal Glands.—Normal.

Intestines.—Normal.

Mesenteric Glands.—The mesenteric glands contained a moderate number of small yellowish-white caseous tubercles.

Ileo-Colic Glands.—One ileo-colic gland contained two small greyish-white tubercles.

Various Lymphatic Glands.

Popliteal.—The left contained in its cortex one minute greyish-white tubercle. The right was normal.

Precrural.—Normal.

Axillary.—The left contained in its cortex two minute grey tubercles. The right was normal.

Ischiatic and Gluteal.—Normal.

Testicles.—Normal.

Microscopical Examination.

Smear from a Thoracic Gland.—Tubercle bacilli fairly numerous.

Tubercle from a Suprarenal Body.—Tubercle bacilli in moderate numbers.

VIRUS H. 78. "O.D."

GENERAL TUBERCULOSIS PROBABLY PRIMARY IN THE CERVICAL GLANDS.

VIRUS H. 78. "O.D."

(December 13, 1906.)

CULTURE INOCULATIONS.

BRONCHIAL GLAND. MARCH 21, 1907.

The strain was derived from the original material, and had been in cultivation a total period of 98 days.

The culture used was the 6th generation, 21 days old.

CALF 1185.

Subcutaneous.
Dose : 50·0 mg.
Killed : July 26, 1907.
127 days.

P.M.—Fibro-caseous local tumour. In the left prescapular gland were two dense caseous masses and small calcareous patches and tubercles. Two left cervical glands showed lesions of similar character. In the lung there was one doubtful tubercle.

GUINEA-PIGS

Inoculated with E. of bronchial gland.

Number.	Method.	Duration of Life.	Result.
2508	Intrap.	K. 61 days	G. T.
2509	Intrap.	K. 61 ,,	G. T.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1215	Intrav.	1·0 mg.	D. 18 days	G. T.
1216	Intrav.	0·1 mg.	K. 140 ,,	Chronic T. of lungs, bronchial glands, and kidneys.
1217	Intrap.	10·0 mg.	D. 28 ,,	G. T.
1218	Subcut.	10·0 mg.	K. 140 ,,	Local T. and slight T. of lungs.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
2321	Intrap.	1·0 mg.	D. 16 days	G. T.
2323	Intrap.	0·1 mg.	D. 65 ,,	G. T.
2322	Subcut.	1·0 mg.	D. 69 ,,	G. T.
2324	Subcut.	0·1 mg.	D. 75 ,,	G. T.

VIRUS H. 78. "O.D."—*continued.*

CULTURE INOCULATIONS—*continued*

MENINGES.

MARCH 21, 1907.

The strain was derived from the original material, through Guinea-pig 2122, and had been in cultivation a total period of 77 days.

The culture used was the 6th generation, 21 days old.

CALF 1179.

Subcutaneous.

Dose : 50·0 mg.

Killed : July 26, 1907.

127 days.

P.M.—Small fibro-caseous local tumour. The left prescapular gland contained three small fibro-calcareous patches. In the thoracic glands were a few minute calcareous tubercles. One mesenteric gland contained a single calcareous grain.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1212	Intrav.	1·0 mg.	D. 28 days	G. T.
1211	Intrav.	0·1 mg.	D. 171 „	G. T.
1213	Intrap.	10·0 mg.	D. 20 „	G. T.
1214	Subcut.	10·0 mg.	K. 188 „	Local T. and one or two nodules in the lungs.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
2325	Intrap.	0·1 mg.	D. 25 days	G. T.
2326	Subcut.	0·1 mg.	D. 68 „	G. T.

VIRUS H. 78. "O.D."—*continued.*

CULTURE INOCULATIONS—*continued.*

LUNG. MARCH 11, 1907.

The strain was derived from the original material through Guinea-pig 2123, and had been in cultivation a total period of 60 days.

The culture used was the 4th generation, 22 days old.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
2290	Intrap.	1·0 mg.	D. 21 days	G. T.
2292	Intrap.	0·1 mg.	D. 21 „	G. T.
2291	Subcut.	1·0 mg.	D. 51 „	G. T.
2293	Subcut.	0·1 mg.	D. 80 „	G. T.

RABBITS

Number.	Method.	Dose.	Duration of Life.	Result.
1200	Intrav.	1·0 mg.	K. 141 days	T. of lungs and kidneys.
1201	Intrav.	0·1 mg.	K. 141 „	T. of lungs and kidneys.
1197	Intrap.	10·0 mg.	K. 141 „	Slight T. of lungs. There was a nodule in subcut. tissues and in wall of stomach; inoculation probably almost entirely intra-stomachic.
1198	Intrap.	1·0 mg.	K. 141 „	Slight T. of omentum and kidneys, moderately severe T. of lungs.
1199	Subcut.	10·0 mg.	K. 141 „	Local T. and T. of lungs.

CALF 1185. Virus H. 78. "O.D."

Subcutaneous inoculation of culture derived from the human bronchial glands direct.

Dose—50·0 milligrammes.

Date of Inoculation—March 21, 1907. [Age about 14 weeks.]

Killed when in good health—July 26, 1907. [127 days after inoculation.]

Clinical Notes.

A tumour developed at the seat of inoculation on the left side of the neck, which at first was slightly raised and flat; on April 19 it measured 11 by 7 cm. Thickened lymphatics were felt in the muscle between the tumour and left prescapular gland; the latter was enlarged, measuring 10 cm. in length.

The tumour subsequently became softened and cystic and diminished in size, as did also the prescapular gland.

The calf remained in good health during the experiment.

Temperature.

During the second and third weeks after inoculation the temperature was very slightly raised (maximum 39·5° C.). Subsequently it remained normal.

Tuberculin Test.

July 5, 1907. [106 days after inoculation.] Slight reaction. Rise of temperature, 0·7° C.

Weights.

	cwt.	qrs.	lbs.
March 21, 1907	1	1	18
July 26, 1907	1	3	26

Total gain of weight.—2 qrs. 8 lbs.

Average rate of gain per week.—3·5 lbs.

POST-MORTEM EXAMINATION.

Carcass.—In good condition.

Local Lesion.—At the seat of inoculation on the left side of the neck there was a prominent hemispherical tumour measuring 6 by 6 by 3 cm.; on section it was composed of greatly thickened skin and a subcutaneous mass of breaking down caseous substance with a fibrous capsule.

Left Prescapular Gland.—The left prescapular gland measured 5 by 3 by 2 cm. and showed on section two dense caseous masses, slightly gritty around the margins, one 2 cm. in greatest diameter, the other smaller and more irregular; there were besides a number of small calcareous tubercles and a few small calcareous patches.

Right Prescapular Gland.—The right prescapular gland measured 4·5 by 2 by 1 cm. and was normal on section.

Cervical Glands.—One of the lower cervical glands on the left side contained a dense caseo-calcareous mass replacing nearly half the gland substance; another smaller gland near the latter showed two calcareous miliary tubercles. Other cervical glands were normal.

Prepectoral and Axillary Glands.—Normal.

Thorax.

Pleura, Thoracic Glands, and Heart.—Normal.

Lungs.—The right caudal lobe showed under the pleura a pinhead-sized transparent grey (?) tubercle with this exception the lungs were perfectly normal.

Abdomen.

Omentum and Peritoneum.—Normal.

Liver.—In the substance of the liver there were about nine nodules ranging in size from a pin's head to a small pea; these had grey margins and canary yellow friable centres (? parasitic).

Spleen, Kidneys and Suprarenal Bodies.—Normal.

Renal, Lumbar and Iliac Glands, Portal and Coeliac Glands.—Normal.

Alimentary Tract.

Tongue, Pharynx, Palate, Tonsils.—Normal.

Retropharyngeal, Submaxillary, Hyoid and Parotideal Glands.—Normal.

Intestines and Mesenteric Glands.—Normal.

Udder.—Normal.

Supramammary Glands.—Normal.

Various Lymphatic Glands.

Precrural and Popliteal, Gluteal and Ischiatic.—Normal.

Microscopical Examination.

Yellow Nodule from Liver.—One tubercle bacillus (?) seen.

Animals Inoculated.

Two guinea-pigs, Nos. 2508 and 2509, were inoculated intraperitoneally with an emulsion made from the left bronchial gland. Both showed general tuberculosis when killed 61 days later.

CALF 1179. Virus H. 78. "O.D."

Subcutaneous inoculation of culture derived from the meninges through Guinea-pig 2122.

Dose—50·0 milligrammes.

Date of Inoculation—March 21, 1907. [Age about 17 weeks.]

Killed when in good health—July 26, 1907. [127 days after inoculation.]

Clinical Notes.

A firm and prominent tumour developed at the seat of inoculation on the left side of the neck; on April 19 it measured 14 by 7 cm. The left prescapular gland became moderately enlarged; on the same date it measured 9 cm. in length. The prepectoral gland was slightly enlarged. On May 14 the tumour was prominent and cystic in the upper half, flattened and firm in the lower, and measured 13 by 6 cm. The prescapular gland was 7·5 cm. in length.

The calf remained in good health during the experiment.

Temperature.

There was a very slight rise of temperature commencing on the 11th day after inoculation, lasting 13 days, and reaching a maximum of 39·8° C. With this exception the temperature was normal during the experiment.

Tuberculin Tests.

May 9, 1907. [49 days after inoculation.] Reacted. Rise of temperature, 1·9° C.

July 5, 1907. [106 days after inoculation.] Reacted. Rise of temperature, 0·9° C.

Weights.

	cwt.	qrs.	lbs.
March 21, 1907	1	1	23
July 26, 1907	2	1	6

Total gain of weight.—3 qrs. 11 lbs.

Average rate of gain per week.—5·2 lbs.

POST-MORTEM EXAMINATION.

Carcass.—In very good condition.

Local Lesion.—At the seat of inoculation on the left side of the neck there was a small tumour measuring 5·5 by 4 by 1·5 cm.; on section it was composed of dense fibrous tissue, with a cavity in the centre 3 cm. in greatest diameter filled with caseopus.

Left Prescapular Gland.—The left prescapular gland measured 6·5 by 3·8 by 1·5 cm., and showed on section three small brownish fibroid patches, the largest not quite 1 cm. in diameter, containing rather sparsely scattered calcareous grains.

Right Prescapular Gland.—The right prescapular gland measured 5 by 2 by 1·2 cm. and was normal on section.

Prepectoral and Axillary Glands.—Normal.

Thorax.

Pleura, Lungs, Heart.—Normal.

Thoracic Glands. — The dorsal mediastinal and bronchial glands were normal in size; each showed in the cortex a few minute calcareous tubercles which readily shelled out.

Abdomen.

Omentum and Peritoneum, Spleen, Liver, and Portal Glands, Kidneys and Suprarenal Bodies, Renal, Lumbar, and Iliac Glands.—Normal.

Alimentary Tract.

Tongue, Pharynx, Palate, Tonsils; Retropharyngeal, Submaxillary, Hyoid, and Parotideal Glands; Intestines:—Normal.

Mesenteric Glands.—In the cortex of one gland a calcareous grain was found; the rest were normal.

Mamma.—Normal.

Supramammary Glands.—Normal.

Various Lymphatic Glands.

Precrural and Popliteal.—Normal.

Gluteal and Ischiatic.—Normal.

Microscopical Examination.

Tubercle from Long Mediastinal Gland.—Tubercle bacilli in moderate numbers.

VIRUS H. 79. "J.N."

TUBERCULOSIS OF THE LUNG

(*Cirrhosis nodosa tuberculosa*).

VIRUS H. 79. "J.N."

(December 28, 1906.)

LUNG.

CULTURE INOCULATIONS, MARCH 23, 1907.

The strain was derived from the human lung, direct, and had been in cultivation a total period of 85 days.

The culture used was the 5th generation, 19 days old.

CALF 1205.

Subcutaneous.

Dose : 50·0 mg.

Killed : August 8, 1907.

138 days.

P.M. — There was a small patch of fibroid tissue surmounted by thickened skin at the seat of inoculation. The left prescapular gland was partly fibro-calcareous, partly caseous. In the lungs three or four translucent foci were seen.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1221	Intrav.	1·0 mg.	D. 33 days	G. T.
1222	Intrav.	0·1 mg.	K. 185 „	T. of lungs, kidneys, and bronchial glands.
1223	Intrap.	10·0 mg.	D. 12 „	Early G. T.
1224	Subcut.	10·0 mg.	K. 185 „	Slight G. T.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
2327	Intrap.	1·0 mg.	D. 18 days	G. T.
2329	Intrap.	0·1 mg.	D. 17 „	G. T.
2328	Subcut.	1·0 mg.	D. 46 „	G. T.
2330	Subcut.	0·1 mg.	D. 18 „	Very slight T. The cause of death was not apparent.

DOG 31 (Young Adult).

Intraperitoneal.

Dose : 50·0 mg.

Died : 31 days.

P.M.—General tuberculosis.

DOG 33 (Puppy).

Intraperitoneal.

Dose : 10·0 mg.

Died : 32 days.

P.M.—General tuberculosis.

CAT 37.

Intraperitoneal.

Dose : 50·0 mg.

Died : 56 days.

P.M.—Slight general tuberculosis. Cause of death not apparent.

VIRUS H. 79. "J.N."—*continued.*

LUNG.

CULTURE INOCULATION, NOVEMBER 28, 1907.

The strain was derived from the lung direct, and had been in cultivation a total period of 335 days.

The culture used was the 15th generation, 20 days old, on glycerin serum.

GOAT 59.

Subcutaneous.
Dose : 100·0 mg.
Killed : March 13, 1908.
106 days.

P.M.—There was a scar at the seat of inoculation and the subcutaneous tissues were beset with caseo-calcareous tubercles. The left prescapular gland was mainly occupied by a large caseous gritty mass. One miliary tubercle was seen in the liver and there were a few small grey tubercles in the kidneys. The mesenteric and ileo-colic glands contained caseous slightly gritty patches or caseous tubercles ; one iliac and one submaxillary gland contained similar lesions.

GUINEA-PIGS.

—	Number.	Method.	Duration of Life.	Result.
Emulsion of tuberculin swelling.	3000	Intrap.	D. 49 days	No tuberculosis.
Emulsion of spleen.	3001	Intrap.	D. 54 ,,	

CALF PASSAGE :

BEGINNING WITH A TISSUE EMULSION MADE FROM A TUBERCULOUS HUMAN LUNG.

An emulsion of human lung was inoculated, on December 28, 1906, into :

GUINEA-PIG 2153.

Intramuscular.
Killed : 52 days.
P.M.—G. T.

RABBIT 1085.

Subcutaneous.
Killed : 103 days.
P.M.—Local T. and slight T. of lungs and kidneys.

Feb. 18, 1907. Emulsion of lesions from Guinea-pig 2153 (T.B. in moderate numbers).

CALF 1139.

Subcutaneous.
Dose : 10·0 cc. of emulsion.
Killed : May 27, 1907. 98 days.

P.M.—Small cystic tumour at seat of inoculation. The left prescapular gland contained four large cysts filled with caseo-pus. No tuberculosis elsewhere.

RABBIT 1175.

Intraperitoneal.
Dose : 1·0 cc. of emulsion.
Killed : 93 days.
P.M.—Chronic G. T.

(*Continued on next page.*)

VIRUS H. 79. "J.N."—*continued.*

Calf Passage.

BEGINNING WITH A TISSUE EMULSION MADE FROM A TUBERCULOUS HUMAN LUNG.

(*Continued from previous page.*)

Emulsion of caseo-pus from prescapular gland of Calf 1139 (1st calf) (T.B. fairly numerous).

CALF 1241.

Subcutaneous.

Dose: 15·0 cc. of emulsion.

Killed: August 15, 1907. 80 days.

P.M.—Cystic local tumour. The left prescapular and one left prepectoral gland were largely composed of caseo-calcareous tissue. In the lung one doubtful tubercle was seen. The thoracic glands showed sparsely scattered yellowish foci.

RABBIT 1306.

Subcutaneous.

Dose: 1·0 cc. of emulsion.

Killed: 115 days.

P.M.—Chronic G. T.

Emulsion of prescapular gland (T.B. in moderate numbers).

CALF 1283.

Subcutaneous.

Dose: 20·0 cc. of emulsion.

Killed: October 29, 1907. 75 days.

P.M.—Small fibroid patch beset with calcareous tubercles at seat of inoculation. In the left prescapular gland there were a few small gritty tubercles. No tuberculosis elsewhere.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1445	Subcut.	2·0 cc.	K. 214 days	Local lesion and slight T. of lungs.
1446	Subcut.	2·0 cc.	K. 214 "	Local T., and miliary T. of lungs.

Emulsion of prescapular gland into:

GUINEA-PIGS 2658-2660.

Killed: 28 days.

P.M.—Early G. T.

November 26, 1907. Emulsion of tissues from G.P's. 2658–2660 (T.B. not very numerous).

CALF 1321.

Intravenous and Intramuscular.

Dose: 10·0 cc. of emulsion by each method—20·0 cc. in all.

Killed: July 15, 1908.

232 days.

P.M.—Fibro-caseous lesion at the seat of the intramuscular inoculation. The adjacent glands contained calcareous nodules. The lungs showed sparsely scattered calcareous tubercles, there were three or four foci in the heart, and a few calcareous tubercles in each suprarenal. The thoracic glands showed calcareous patches and there were calcareous tubercles in many abdominal glands.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1577	Subcut.	2·0 cc.	D. 175 days	G. T.
1578	Subcut.	2·0 cc.	K. 185 "	Local T. and slight T. of lungs and kidneys.

CULTURE.

Derived from the portal gland of Calf 1321. Duration of cultivation, 86 days. The 6th generation of culture, 9 days old, was used for inoculation on October 9, 1908.

CALF 1487.

Subcutaneous.

Dose: 100·0 mg.

Killed: January 12, 1909.

95 days.

P.M.—Fibrous-walled cyst at seat of inoculation with caseo-purulent contents; the left prescapular gland contained three fibro-caseo-calcareous nodules. There was one grey tubercle in the lung.

RABBIT 2031.

Subcutaneous.

Dose: 10·0 mg.

Killed: 160 days.

P.M.—Local T. and slight T. of lungs and kidneys.

VIRUS H. 79. "J.N."—*continued.*

CALF PASSAGE,

BEGINNING WITH A CULTURE DERIVED FROM A HUMAN TUBERCULOUS LUNG.

CULTURE.

The culture was obtained direct from the lung. Duration of artificial cultivation, 85 days. The 5th generation, 19 days old, was used for inoculation on March 23, 1907.

DOG 31 (Young Adult).
Intraperitoneal.
Dose : 50·0 mg.
Died : April 24, 1907. 31 days.
P.M.—General tuberculosis.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1221	Intrav.	1·0 mg.	D. 33 days	G. T.
1222	Intrav.	0·1 mg.	K. 185 „	T. of lungs, kidneys, and bronchial glands.
1223	Intrap.	10·0 mg.	D. 12 „	Early G. T.
1224	Subcut.	10·0 mg.	K. 185 „	Slight G. T.

CALF 1205.
Subcutaneous.
Dose : 50·0 mg.
Killed : August 8, 1907. 138 days.

P.M.—There was a small patch of fibroid tissue surmounted by thickened skin at seat of inoculation. The left prescapular gland was partly fibro-calcareous, partly caseous. In the lungs three or four translucent foci were seen.

Emulsion of spleen ; very rich in T.B.

CALF 1243.
(*For the continuation of this branch of the passage experiment, see next chart.*)

Emulsion of omentum ; very rich in T.B.

CALF 1227.
Subcutaneous.
Dose : 10·0 cc. of emulsion.
Killed : July 24, 1907. 91 days.

P.M.—Cystic local tumour. The prescapular gland was riddled with cavities containing caseo-pus or firm caseous sequestra. In the lungs were three, in the liver one, in the right kidney one, and in one suprarenal three, small grey tubercles or tuberculous foci. The posterior mesenteric and the ileocolic glands contained scattered calcareous foci.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1273	Subcut.	4·0 cc.	K. 105 days	Chronic G. T.
1274	Subcut.	4·0 cc.	D. 44 „	Slight G. T. (? cause of death.)

Emulsion of prescapular gland (T.B. numerous).

CALF 1259.
Subcutaneous.
Dose : 20·0 cc. of emulsion.
Killed : October 16, 1907. 84 days.

P.M.—Fibro-caseo-calcareous local tumour. The right prescapular gland was irregularly caseo-calcareous, and four cervical glands showed caseous and calcareous lesions. The lungs and liver contained a few scattered small calcareous tubercles ; ten miliary tubercles were seen in the two suprarenals. Most of the abdominal glands and the precrural glands contained scattered calcareous tubercles or foci ; in the thoracic and a few ileo-colic glands calcareous patches were seen as well as discrete tubercles.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1396	Subcut.	2·0 cc.	K. 119 days	Local T. only.
1397	Subcut.	1·0 cc.	K. 119 „	Local lesion. One tubercle in the lung.

Emulsion of thoracic glands into :

GUINEA-PIGS 2637-2638.
Killed after 22 days and showed early general tuberculosis.

Emulsion of G.P.'s tissues (T.B. in moderate numbers).

GUINEA-PIGS 2697-2698.
Died or killed after 20 days and showed general tuberculosis.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1555	Subcut.	—	K. 113 days	Slight G. T. (retrogressive).
1556	Subcut.	—	D. 97 „	Slight G. T. (Death from other causes.)

November 27, 1907. Emulsion of G.P.'s tissues (T.B. moderately numerous).

CALF 1305.
Subcutaneous.
Dose : 20·0 cc. of emulsion.
Killed : April 16, 1908. 141 days.

P.M.—Fibro-caseous tumour. In the left prescapular gland there were three fibro-calcareous patches, in one of which was a softened caseous nodule. There was a calcareous nodule in one cervical gland and scattered calcareous foci in the thoracic glands. No tuberculosis elsewhere.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1579	Subcut.	2·0 cc.	K. 187 days	Local T. and slight T. of lungs.
1580	Subcut.	2·0 cc.	K. 187 „	Local T. and slight T. of lungs and kidneys.

Emulsion of thoracic glands into :

GUINEA-PIG 3029.
Killed : 42 days.
P.M.—G. T.

CULTURE.
Derived from the sternal gland of the guinea-pig.

Duration of artificial cultivation, 99 days. The 5th generation, 20 days old, was used on September 4, 1908, for inoculating :

CALF 1433.
Subcutaneous.
Dose : 82·0 mg.
Killed : December 11, 1908. 98 days.

P.M.—There was a cyst at the seat of inoculation containing caseo-pus and caseous masses. The left prescapular gland contained caseous gritty areas involving half the gland substance. There was no tuberculosis elsewhere.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1988	Subcut.	50·0 mg.	K. 175 days	Local lesion ; T. of lungs (moderately severe) and of kidneys.
1989	Subcut.	10·0 mg	D. 93 „	Local T. ; T. of lungs and slight T. of kidneys.

Duration of artificial cultivation : 48 days.
The 2nd generation, 13 days old, was used on July 15, 1908, for inoculating :—

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Results.
1930	Subcut.	One Serum Culture	K. 174 days	Pseudo-tuberculosis
1931	Subcut.	One Serum Culture	K. 174 days	Local lesion, T. of lungs, and of kidneys and intestines (slight).

Emulsion of prescapular gland into :

GUINEA-PIGS 2633-2636.
All were killed after 27 days and showed early general tuberculosis.

November 12, 1907. Emulsion of G.P.'s tissues (T.B. not numerous).

CALF 1297.
Subcutaneous.
Dose : 20·0 cc. of emulsion.
Killed : April 16, 1908.
156 days.

P.M.—Small cyst with very thick fibrous walls. The left prescapular gland contained two calcareous nodules. Two cervical glands were large and fibro-calcareous ; three other cervical glands and two glands within the entrance to the thorax were affected more or less severely. There was no tuberculosis elsewhere.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1563	Subcut.	3·0 cc.	K. 188 days	Local T. and T. of lungs and kidneys.
1564	Subcut.	3·0 cc.	K. 188 „	G. T. (Lung tuberculosis suspicious).

CULTURE.
The strain was derived from the prescapular gland of Calf 1259, and had been in cultivation a total period of 64 days.
The culture used for inoculation on December 19, 1907, was the 4th generation, 9 days old.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1611	Subcut.	43·5 mg.	D. 186 days	Local T. and T. of lungs and kidneys ; apparently insufficient to account for death.
1612	Subcut.	10·0 mg.	K. 204 „	G. T.

VIRUS H. 79. "J.N."—*continued.*

CALF PASSAGE—*completed.*

Emulsion of spleen of Dog 31, very rich in T.B. (see preceding chart).

CALF 1243.

Subcutaneous.

Dose : 20·0 cc. of emulsion.

Killed, when in fair health : June 1, 1907.

38 days.

P.M. — Large ulcerated and collapsed abscess at seat of inoculation. The left prescapular gland was enlarged and caseonecrotic almost throughout. In the lungs there were fairly numerous reddish-grey foci. In the kidneys and suprarenals were some small grey tubercles. Yellow foci were seen in the mesenteric and ileo-colic glands, and the latter showed in places a fine yellow network.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1271	Subcut.	1·0 cc.	K. 105 days	Local T. and T. of the lungs.
1272	Subcut.	1·0 cc.	K. 105 „	Chronic G. T.

CALF 1225.

Subcutaneous.

Dose : 20·0 cc. of emulsion of prescapular gland of Calf 1243 (T.B. fairly numerous).

Killed : August 23, 1907. 83 days.

P.M.—Very large cystic local tumour. The left prescapular and one prepectoral gland were much enlarged caseous and softened. In the lungs there were a few small caseous tubercles ; three thoracic, a few mesenteric and one ileo-colic gland contained each one or two small caseous tubercles and one mesenteric gland contained a caseous gritty nodule (from this nodule a culture was isolated which had the cultural characters and virulence of the avian tubercle bacillus).

RABBITS.

—	Number.	Method.	Duration of Life.	Result.
Emulsion of spleen.	1319	Subcut.	K. 128 days	Local lesion and very slight T. of lungs.
Emulsion of lung.	1320	Subcut.	K. 128 „	Local T. only.

Emulsion of left prescapular gland (T.B. in moderate numbers).

CALF 1277.

Subcutaneous.

Dose : 20·0 cc. of emulsion.

Killed : November 29, 1907. 98 days.

P.M.—The local tumour was composed partly of fibro-caseo-calcareous tissue, partly of caseo-pus, enclosed in a fibrous capsule. The left prescapular gland contained a few calcareous nodules, and a calcareous patch ; the left prepectoral was largely caseo-calcareous. One minute tubercle was seen in the lung.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1471	Subcut.	3·0 cc.	K. 216 days	Local lesion and three tubercles in the lungs.
1472	Subcut.	3·0 cc.	K. 216 „	Local lesion and very slight T. of lungs.

Emulsion of the tuberculous glands into :

GUINEA-PIGS 2802-2804.

Killed : 31 days.

P.M's.—All showed early G. T.

December 30, 1907. Emulsion of tissues from G.P.'s 2802-4 (T.B. not very numerous).

CALF 1325.

Subcutaneous and Intravenous.

Dose : 10·0 cc. of the emulsion by each method—20·0 cc. in all.

Killed : July 16, 1908. 199 days.

P.M. — Small cyst with caseo-purulent contents at seat of inoculation. There were two small calcareous nodules in the left prescapular gland. The lung showed a calcareous nodule and two calcareous tubercles, and there were small calcareous patches in the thoracic glands.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1620	Subcut.	4·0 cc.	K. 189 days	G. T.
1621	Subcut.	4·0 cc.	K. 189 „	Local lesion. T. of lungs and kidneys.

Emulsion of left bronchial gland into :

GUINEA-PIG 3158.

Died : 46 days.

P.M.—G. T.

CULTURE.

Derived from the manubrial gland of the guinea-pig ; duration of artificial cultivation, 60 days. The 4th generation, 10 days old, was used on October 30, 1908, for inoculating :

CALF 1479.

Subcutaneous.

Dose : 100·0 mg.

Killed : February 23, 1909. 116 days.

P.M.—The local tumour was cystic and the adjacent glands contained caseous gritty masses. The suprarenals contained altogether nearly two dozen calcareous tubercles ; the mesenteric and ileo-colic and a few other abdominal glands contained discrete calcareous tubercles ; the thoracic glands contained small calcareous patches. One supramammary gland contained a calcareous grain.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2057	Subcut.	10·0 mg.	K. 167 days	Local T., and slight T. of lungs and kidneys.
2058	Subcut.	10·0 mg.	K. 167 „	Local T., and slight T. of lungs and kidneys.

CALF 1205. Virus H. 79. "J.N."

Subcutaneous inoculation of culture derived from the human lung, direct.

Dose—50·0 milligrammes.

Date of Inoculation—March 23, 1907. [Age about 13 weeks.]

Killed when in good health—August 8, 1907. [138 days after inoculation.]

Clinical Notes.

A month after inoculation there was a prominent firm swelling at the seat of inoculation on the left side of the neck, which measured 14 by 9 cm. The adjacent prescapular gland was considerably enlarged, measuring about 14 cm. in length; the tissues around it were somewhat oedematous. The calf was in good health.

Eight weeks after inoculation the local tumour was prominent pendulous and fluctuating, measuring 15 by 9 cm. The skin over the lower part had just broken down and there was a discharge of caseo-pus. The gland was moderately enlarged, 10 cm. in length.

The discharge from the tumour continued, and the latter rapidly decreased in size, being at length represented only by a raised patch at the seat of inoculation.

The calf remained well during the experiment.

Temperature.

During the first four weeks the temperature was irregular and somewhat raised (maximum 40·2° C. on the 13th and 14th days); subsequently it remained normal.

Tuberculin Test.

July 5, 1907. [104 days after inoculation.] Slight reaction. Rise of temperature, 0·8° C.

Weights.

	cwt.	qrs.	lbs.
March 23, 1907	1	0	23
August 8, 1907	2	2	9

Total gain of weight.—1 cwt. 1 qr. 14 lbs.

Average rate of gain per week.—7·5 lbs.

POST-MORTEM EXAMINATION.

Carcass.—In good condition.

Local Lesion.—At the seat of inoculation on the left side of the neck there was a patch about the size of the palm of one's hand, of thickened skin, 1·5 cm. in greatest thickness, which showed towards one margin a depressed scar; under the central part of this thickened skin there was a thin patch of pinkish fibroid tissue containing a few scattered calcareous grains.

Left Prescapular Gland.—The left prescapular gland measured 5·1 by 2·5 by 2·5 cm.; on section it contained two dense pinkish caseous masses, one 2·5 the other 1·5 cm. in greatest diameter; the rest of the gland was very fibroid and beset with yellow calcareous foci; the capsule was greatly thickened.

Right Prescapular Gland.—The right prescapular gland measured 5·3 by 2 by 1·1 cm. and was normal on section.

Prepectoral and Axillary Glands.—Normal.

Thorax.

Pleura.—Normal.

Lungs.—Three or four grey translucent bodies, each about 1 mm. in diameter were seen under the pleura; one had a minute opaque centre; otherwise the lungs were normal.

Thoracic Glands and Heart.—Normal.

Abdomen.

Omentum and Peritoneum; Spleen, Liver and Portal Glands, Kidneys and Suprarenals; Renal, Lumbar and Iliac Glands.—Normal.

Alimentary Tract.

Tongue, Pharynx, Palate, Tonsils; Submaxillary, Pharyngeal, Hyoid and Parotideal Glands; Intestines and Mesenteric Glands.—Normal.

Testicles.—Normal.

Eyes.—Normal.

Various Lymphatic Glands.

Precrural, Popliteal, Gluteal, Ischiatic, Pudic.—Normal.

Microscopical Examination.

Smear from Left Prescapular Gland.—Tubercle bacilli fairly numerous.

CALF 1139. Virus H. 79. "J.N."

Subcutaneous inoculation of emulsion of tissues from G.P. 2153, inoculated with an emulsion of human lung.

Dose—10·0 cc. of emulsion, containing tubercle bacilli in moderate numbers.

Date of Inoculation—February 18, 1907. [Age about 6 months.]

Killed when in good health—May 27, 1907. [98 days after inoculation.]

Clinical Notes.

A moderate-sized tumour developed at the seat of inoculation on the left side of the neck; on the 14th March this measured 15 by 8 cm., was prominent, circumscribed, and in parts soft and fluctuating. The adjacent prescapular gland was enlarged and measured 11 cm. in length.

A few days later the tumour opened and discharged its contents, subsequently diminishing considerably in size.

On May 14 it was represented by a slightly raised thickening showing in one part a small cystic prominence 4 cm. in diameter. The prescapular gland then measured about 9 cm. in length.

The calf remained in good health and condition during the experiment.

Temperature.

On the 18th day the temperature rose to 40·2° C.; it then fell to normal, rising again to 40·4° C. on the 29th day. Subsequently it remained approximately normal, the maximum range of variation being 1·3° C. (38°–39·3° C.).

Tuberculin Test.

May 9. [80 days after inoculation.] Reacted. Rise of temperature, 2·0° C.

Weights.

The calf gained considerably in weight during the experiment.

	cwt.	qr.	lbs.
February 18, 1907	2	1	26
May 27, 1907	3	1	15

Total gain of weight.—3 qrs. 17 lbs.

Average rate of gain per week.—7·2 lbs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—At the seat of inoculation on the left side of the neck there was a tense fluctuating tumour the size of a pigeon's egg; this on section was a cyst with fibrous walls of varying thickness containing yellow serous fluid and yellowish white caseo-pus.

The skin about 2 in. below the inferior extremity of the cyst showed a small depressed scar, and the subcutaneous tissues between this and the cyst were thickened.

Left Prescapular Gland.—The left prescapular gland measured 8 by 5 by 3·5 cm. On section it was found to contain three large cysts, the largest about 4 cm. in diameter, composing from two-thirds to three-quarters of the whole gland; the cysts were filled with thick creamy caseo-pus and surrounded by fibrous tissue lined internally with granulation tissue.

Right Prescapular Gland.—The gland measured 5 by 2·5 by 1·5 cm., and was normal on section.

Prepectoral and Axillary Glands.—Normal.

Thorax.

Pleura, Lungs, Thoracic Glands, Heart.—Normal.

Abdomen.

Peritoneum, Omentum, Liver, Portal Glands, Spleen.—Normal.

Kidneys.—A lobule in one of the kidneys was almost completely replaced by a multilocular cyst with clear fluid contents; there were no tubercles in either kidney.

Suprarenal Bodies.—Normal.

Alimentary Tract.

Tongue, Pharynx, Palate, Tonsils; Submaxillary, Hyoid, Parotid, and Pharyngeal Glands; Intestines and Mesenteric Glands.—Normal.

Testes.—Normal.

Various Lymphatic Glands.

Precrural, Popliteal, Gluteal, Ischiatic, Pudic, Renal, Lumbar, Iliac.—Normal.

Microscopical Examination.

Emulsion of Pus from Prescapular Gland.—Tubercle bacilli fairly numerous.

Animals Inoculated.

Calf 1241 was inoculated subcutaneously with 15·0 cc. of emulsion of pus from the left prescapular gland.

Rabbit 1306 received 1·0 cc. of the same emulsion subcutaneously; it was killed after 115 days and showed general tuberculosis of a chronic type.

CALF 1241. Virus H. 79. "J.N."

Subcutaneous inoculation of an emulsion of caseo-pus from the left prescapular gland of Calf 1139.

Dose—15·0 cc. of emulsion containing fairly numerous tubercle bacilli.

Date of Inoculation—May 27, 1907. [Age about 14 weeks.]

Killed when in good health—August 15, 1907. [80 days after inoculation.]

Clinical Notes.

A tumour of the character usually produced by viruses of slight virulence for bovines developed at the seat of inoculation on the left side of the neck, and the adjacent prescapular gland became enlarged.

The calf remained in good health during the experiment.

Temperature.

On the 16th day the temperature rose to 39·4° C., and reached a maximum of 40·8° C. on the 19th day. It then slowly fell, regaining the normal on the 34th day; the temperature subsequently remained normal.

Tuberculin Test.

The calf was not tested subsequent to inoculation.

Weights.

	cwt.	qrs.	lbs.
May 27, 1907	1	1	8
August 15, 1907	1	3	15

Total gain of weight.—2 qrs. 7 lbs.

Average rate of gain per week.—5·5 lbs

POST-MORTEM EXAMINATION.

Carcass.—In good condition.

Local Lesion.—At the seat of inoculation on the left side of the neck there was a pear-shaped fluctuating swelling, measuring 10 by 6 by 5 cm.; on section the tumour was a cyst with thin fibrous walls and thick yellow caseo-purulent contents; the cavity was crossed by numerous trabeculae of fibrous tissue.

Left Prescapular Gland.—The left prescapular gland was moderately large measuring about 7·5 cm. in length; on section more than three-quarters of the gland was composed of breaking-down caseo-calcareous tuberculous tissue surrounded by fibrous tissue.

Right Prescapular Gland.—The gland measured 4·5 by 2 by 1 cm. and was normal on section.

Prepectoral Glands.—One on the left side measured 1·8 cm. in greatest diameter and was composed almost throughout of dense yellow caseous substance slightly gritty from calcification; the capsule was much thickened; other prepectoral glands were normal.

Axillary Glands.—Normal.

Thorax.

Pleura.—Normal.

Lungs.—There was one doubtful grey tubercle under the pleura; otherwise the lungs were perfectly normal.

Thoracic Glands.—The bronchial and dorsal mediastinal glands were normal in size and showed on section very sparsely scattered yellowish-white foci, not perceptibly gritty.

Heart.—Normal.

Abdomen.

Omentum and Peritoneum; Spleen, Liver, Portal Glands, Kidneys and Suprarenals; Coeliac, Renal, Lumbar and Iliac Glands.—Normal.

Alimentary Tract.

Tongue, Pharynx, Palate, Tonsils; Submaxillary, Retropharyngeal, Hyoid and Parotideal Glands; Intestines and Mesenteric Glands.—Normal.

Testicles.—Normal.

Eyes.—Normal.

Various Lymphatic Glands.

Precrural, Popliteal, Gluteal, Ischiatic, Pudic.—Normal.

Microscopical Examination.

Emulsion of Left Prescapular Gland.—Tubercle bacilli in moderate numbers.

Emulsion of Left Prepectoral Gland.—Tubercle bacilli in moderate numbers.

Animals Inoculated.

Calf 1283 was inoculated subcutaneously with 20·0 cc. of an emulsion made from the left prescapular gland.

Rabbits 1445 and 1446 were inoculated each with 2·0 cc. of the same emulsion, also subcutaneously. They were each killed after 214 days and showed slight generalized tuberculosis.

CALF 1283. Virus H. 79. "J.N."

Subcutaneous inoculation of emulsion of the left prescapular gland from Calf 1241.

Dose—20·0 cc. of emulsion containing tubercle bacilli in moderate numbers.

Date of Inoculation—August 15, 1907. [Age about 6 weeks.]

Killed when in good health—October 29, 1907. [75 days after inoculation.]

Clinical Notes.

A slight thickening only developed at the seat of inoculation, and the adjacent gland did not become appreciably enlarged. The calf remained well.

Temperature.

Approximately normal.

Tuberculin Test.

October 24, 1907. [70 days after inoculation.] Reacted. Rise of temperature, 1·3° C.

Weights.

	cwt.	qrs.	lbs.
August 15, 1907	0	3	8
October 29, 1907	1	0	22

Total gain of weight.—1 qr. 14 lbs.
Average rate of gain per week.—4 lbs.

POST-MORTEM EXAMINATION.

Carcass in good condition.

Local Lesion.—In the subcutaneous tissues on the left side of the neck there was a thin layer, 9 by 5 cm. in area, of whitish fibrous tissue closely beset with yellow calcareous tubercles with grey margins.

Left Prescapular Gland.—The left prescapular gland measured 4 by 2 cm. by rather less than 1 cm. in thickness, and showed on section a group of three or four small yellow gritty tubercles the largest the size of a pin's head.

Right Prescapular Gland.—The right prescapular gland measured 4·5 by 2 by 1 cm., and was slightly oedematous; there were no tubercles.

Axillary, Prepectoral and Cervical Glands.—Normal.

All the organs, and the lymphatic glands not hitherto mentioned, were examined and found normal.

Microscopical Examination.

Emulsion of Left Prescapular Gland.—No tubercle bacilli seen.

Animals Inoculated.

Three guinea-pigs, Nos. 2658, 2659, and 2660, were inoculated intraperitoneally with an emulsion of the left prescapular gland, and one, No. 2661, with an emulsion of the left bronchial gland. All were killed after 28 days and showed early general tuberculosis.

CALF 1321. Virus H. 79. "J.N."

Intravenous and Intramuscular inoculation of an emulsion of tuberculous tissues from Guinea-pigs 2658, 2659, 2660 inoculated with an emulsion of the prescapular gland of Calf 1283.

Dose $\left\{\begin{array}{l}\text{10·0 c.c. intravenously}\\ \text{10·0 c.c. intramuscularly}\end{array}\right\}$ Tubercle bacilli were not very numerous in the emulsion.

Date of Inoculation—November 26, 1907. [Age about 17 weeks.]

Killed when in good health—July 15, 1908. [232 days after inoculation.]

Clinical Notes.

Ten cubic centimetres of the emulsion was injected into the vein of the left ear; this caused such severe symptoms that the remainder of the dose was injected intramuscularly on the left side of the neck.

Nine days later there was an elongated thickening in the muscles of the left side of the neck. The coat of the animal was rough, but the appetite was good and the respiration not increased.

During the following fortnight the respiration became laboured and rapid, the calf lost flesh, was very ill, and appeared likely to die; the temperature during this period was high (40·–41·° C.).

During the fourth week after inoculation the severity of the symptoms subsided, the respiration and temperature becoming normal; the calf rapidly regained health and strength, and during the remaining period of the experiment (seven months) was in good health and grew normally.

Temperature.

On the ninth day after inoculation the temperature rose to 39·9° C., and reached 40·8° C. on the 15th day; it was very high during the following twelve days (varying between 40·3 and 40·9° C.); and it then fell to 39·0 C.

From the 39th day after inoculation onwards the temperature was normal.

Tuberculin Tests.

February 21, 1908. [87 days after inoculation.] Dose, 1·0 cc. Slight reaction. Rise of temperature, 0·8° C.

March 4, 1908. [99 days after inoculation.] Dose, 1·0 cc. No reaction. Rise of temperature, 0·4° C.

May 20, 1908. [176 days after inoculation.] Dose, 2·0 cc. Reacted. Rise of temperature, 1·3° C.

Weights.

	cwt.	qr.	lbs.
November 26, 1907 ...	1	1	23
July 15, 1908	2	3	17

Total gain of weight.—1 cwt. 1 qr. 22 lbs.

Average rate of gain per week.—5·1 lbs.

POST-MORTEM EXAMINATION.

The carcass was fat.

Local Lesion.—In the muscles on the left side of the neck there was an elongated fibrous cord the thickness of one's little finger, measuring 8 cm. in length; on section it contained a series of coarsely granular calcareous nodules varying in size.

Cervical Glands.—On the left side one in the middle of the neck the size of a kidney bean was more than three-quarters calcareous; the other cervical glands were normal.

Prescapular Glands.—The left prescapular gland showed on section four small calcareous nodules varying in size up to about 8 mm. in greatest diameter.

The right prescapular gland was larger than the left, measuring 6 by 2·5 by 1·2 cm., and was normal on section.

Prepectoral Glands.—One left prepectoral gland contained a pea-sized calcareous nodule.

The right prepectoral glands were normal.

Thorax.

Heart.—Under the endocardium of the right auricle there were three minute calcareous foci and on the surface one minute transparent tubercle. The heart was otherwise normal.

Lungs.—The lungs were crepitant throughout and collapsed normally; they showed on the surface just under the pleura sparsely scattered calcareous tubercles with grey margins, the largest 1 mm. in diameter; similar tubercles were sparsely scattered throughout the substance of the lung.

Thoracic Glands.—The bronchial and mediastinal glands were not obviously enlarged, but felt hard; on section they showed in the depth of their cortices numerous calcareous patches, in some continuously replacing the gland substance; these patches were dry, easily shelled out and composed of closely aggregated calcareous granules, and were separated from the capsule of the gland by normal gland tissue; in some of the smaller glands the central part was occupied by a single calcareous patch.

Pleura.—Normal.

Abdomen.

Omentum, Peritoneum, Spleen and Liver.—Normal.

Portal Glands.—The portal glands were not enlarged and showed in the cortices scattered irregular calcareous tubercles ranging in size from a mere point up to about 2 mm. in diameter.

Kidneys.—Normal.

Suprarenal Bodies.—In the cortex of the left suprarenal body there were four and in that of the right three calcareous tubercles, the largest the size of a pin's head.

Renal and Lumbar Glands.—The renal gland (on the right side) showed in the cortex a number of minute discrete calcareous foci.

Two lumbar glands contained scattered calcareous foci.

Alimentary Tract.

Tongue, Pharynx, Tonsils, Submaxillary and Retro-Pharyngeal Glands.—Normal.

Parotideal Glands.—The left contained two calcareous nodules, one the size of a pea, the other that of a hempseed. The gland on the right side was normal.

Intestines.—Two Peyer's patches showed scattered minute soft whitish points.

The large intestine was normal.

Mesenteric Glands. — Nearly all the mesenteric glands contained sparsely scattered calcareous foci or small nodules similar to those in the portal glands.

Ileo-Colic Glands. — The ileo-colic glands were similarly affected, but the nodules were larger and more numerous.

Testicles.—Normal.

Various Lymphatic Glands.

Precrural, Popliteal, Axillary, Pudic, Gluteal, Ischiatic.—Normal.

Microscopical Examination.

Emulsion of Prescapular Gland.—A few tubercle bacilli seen.

Emulsion of Bronchial Gland.—A few tubercle bacilli seen.

Emulsion of Portal Gland.—A few tubercle bacilli seen.

Focus from Peyer's patch in Small Intestine.—No tubercle bacilli.

Animals Inoculated.

One guinea-pig, No. 3150, was inoculated intraperitoneally with an emulsion made from the lung; killed after 75 days; general tuberculosis.

Two guinea-pigs, Nos. 3151 and 3152, were inoculated intraperitoneally with an emulsion of the left bronchial gland; died in 74 and 26 days; general tuberculosis.

One guinea-pig, No. 3149, was inoculated intraperitoneally with an emulsion made from the spleen; killed after 75 days; healthy.

CALF 1487. Virus H. 79. "J.N."

Subcutaneous inoculation of culture derived from the portal gland of Calf 1321.

Dose—100·0 milligrammes.

Date of Inoculation—October 9, 1908. [Age about six months.]

Killed when in good health—January 12, 1909. [95 days after inoculation.]

Clinical Notes.

A tumour of moderate size developed at the seat of inoculation; ten days after inoculation it was firm, flat and measured 15 by 8 cm. Afterwards it became soft and fluctuating but did not ulcerate. The left prescapular gland became enlarged—it measured 7 cm. at the time of maximum development.

The calf remained well during the experiment.

Temperature.

On the 7th day after inoculation the temperature rose to 40·5° C. and remained high for fifteen days; the maximum temperature recorded during this period was 40·7° C., the minimum 39·4° C. Subsequently the temperature was normal.

Tuberculin Test.

January 7, 1909. [90 days after inoculation.] Dose, 2·0 cc. Reacted. Rise of temperature, 1·9° C.

Weights.

	cwt.	qrs.	lb.
October 9, 1908	2	0	0
January 12, 1909	2	2	1

Total gain of weight.—2 qrs. 1 lb.

Average rate of gain per week.—4·2 lbs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—At the seat of inoculation on the left side of the neck there was a fluctuating somewhat pear shaped swelling measuring 14 by 9 by 6 cm.; on section it was a cyst, with fibrous wall lined internally with gritty granulation tissue, and caseous and caseo-purulent contents.

Left Prescapular Gland.—The left prescapular gland measured 5·5 by 3·4 by 1·5 cm., and showed in the cortex three nodules the largest 8 mm. in diameter; they were composed of brownish fibroid tissue containing minute calcareo-caseous or larger caseo-calcareous foci.

The Right Prescapular Gland measured 5·5 by 3 by 1·4 cm.; it was oedematous but showed no sign of tuberculosis; the enlargement and oedema were due to the recent tuberculin test.

Cervical, Axillary, and Prepectoral Glands.—Normal.

Lungs.—On the surface of one of the lobes just under the pleura a grey tubercle 1 mm. in diameter with an opaque centre was seen; otherwise the lungs were perfectly normal.

The remaining organs and glands were examined and found normal.

CALF 1227. Virus H. 79. "J.N."

Subcutaneous inoculation of an emulsion made from the omentum of Dog 31.

Dose—10·0 cc. of emulsion, which was very rich in tubercle bacilli.

Date of Inoculation—April 24, 1907. [Age 12 weeks.]

Killed when in good health—July 24, 1907. [91 days after inoculation.]

Clinical Notes.

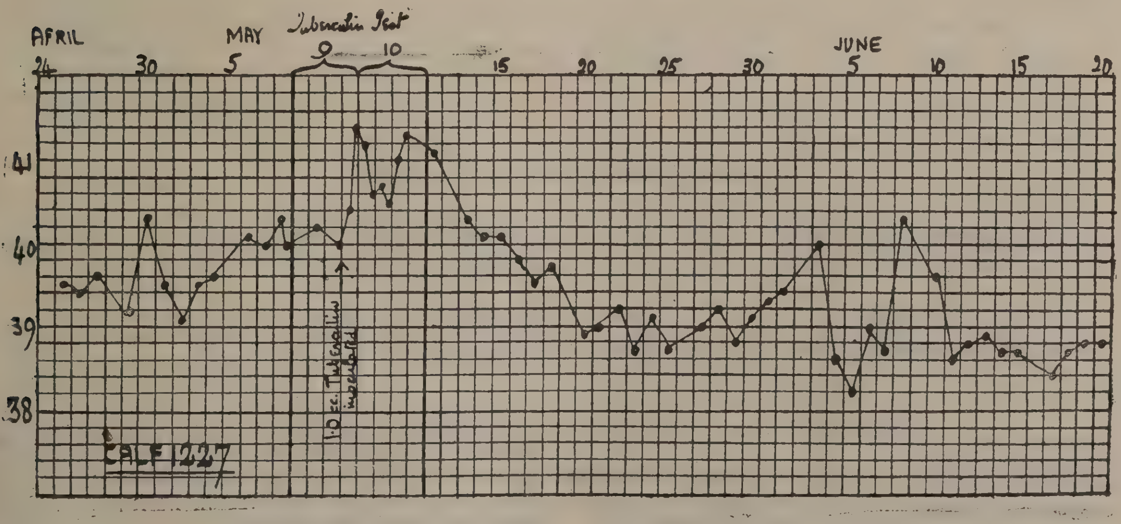
The calf was first noticed to be ill on May 8, a fortnight after the subcutaneous inoculation; it looked thin and dejected, and had lost its appetite.

During the week following the animal seemed to be very ill; its coat was "staring" and it stood with humped shoulders and hollow back. The respiration was slightly increased in frequency. The temperature ranged between 40·1 and 41·1° C. The tumour at the seat of inoculation was at this time large (17 by 11 cm.), fluctuating, somewhat pendulous, and appeared to be slightly adherent to the prescapular gland. There was a moderate amount of oedema in the dewlap. The left prescapular gland, partially concealed by the tumour, measured about 12 cm. in length.

During the latter half of May the temperature fell, the increased frequency of respiration became less marked, and the general condition of the animal rapidly improved.

This improvement subsequently continued, and for several weeks before the calf was killed (on July 24) it was quite well, and its temperature was normal.

Temperature. (Chart to June 20.)



From June 20 to July 24 the temperature was normal.

Tuberculin Test.—May 9. [15 days after inoculation.] Reacted. Rise of temperature, 1·1° C.

Weights.

	cwt.	qrs.	lbs.
April 24, 1907	1	0	17
July 24, 1907	2	0	4

Total gain of weight.—3 qrs. 15 lbs.

Average rate of gain per week.—7·6 lbs.

POST-MORTEM EXAMINATION.

Carcass.—In good condition.

At the seat of inoculation, on the left side of the neck, there was a pendulous fluctuating tumour, measuring 10 by 8 by 7 cm.; on section it was a cyst, with rather thin fibrous walls lined internally with granulation tissue, and thick curdy caseo-purulent contents.

A thickened tuberculous lymphatic cord extended in the subcutaneous tissues a short distance towards the prescapular gland.

Left Prescapular Gland.—The left prescapular gland measured 8 by 5 by 3·2 cm. and was riddled with cavities; a few of these contained sequestra of firm caseous substance, but the majority were filled with caseo-pus; they were surrounded by translucent fibrous tissue beset with calcareous and softened caseous foci; many were crossed by slender fibrous trabeculæ; about three-quarters of the gland was tuberculous.

Right Prescapular Gland.—The gland measured 5·3 by 2·5 by 1·1 cm., and was normal on section.

Prepectoral Glands.—One on the left side, the size of a thrush's egg, was more than three-quarters caseous and softened; the others were normal.

The glands on the right side were normal.

Axillary Glands.—Normal.

Thorax.

Pleura.—Normal.

Lungs.—The ventral part of the right cephalic lobe was collapsed and consolidated and slightly adherent to the costal pleura; on section the bronchi were dilated and filled with mucus; the rest of the lung was crepitant. In the substance of the lung under the pleura three pinhead sized translucent tubercles were seen and a few doubtful grey points. The lymphatic fringes around the margins of the caudal lobes and along the interlobular septa were slightly hypertrophied.

Thoracic Glands.—Normal.

Heart.—Normal.

Abdomen.

Omentum and Peritoneum.—Normal.

Liver.—In the substance of the liver under the capsule a minute greyish yellow focus was seen, otherwise the liver was normal.

Portal Glands.—Normal.

Spleen.—Normal.

Kidneys.—In the cortex of the right kidney a minute grey focus was seen; the left was normal.

Suprarenal Bodies.—The left showed in the cortex three greyish white tubercles, the largest the size of a millet seed.

The right was normal.

Renal, Lumbar, and Iliac Glands.—Normal.

Alimentary Tract.

Tongue, Pharynx, Palate, Tonsils.—Normal.

Retropharyngeal, Submaxillary, Hyoid, and Parotideal Glands.—Normal.

Intestines.—Normal.

Mesenteric Glands.—The majority of those in the posterior part of the mesentery showed in the cortex sparsely scattered minute calcareous foci; those in the anterior part were normal.

Ileo-colic Glands.—These glands showed in the cortex calcareous foci similar to but rather more numerous than those in the terminal mesenteric.

Testes.—Normal.

Eyes.—Normal.

Various Lymphatic Glands.

Precrural, Popliteal, Gluteal, Ischiatic, Pubic.—Normal.

Microscopical Examination.

Emulsion of Prescapular Gland.—(1) Tubercle bacilli very numerous. (2) Tubercle bacilli numerous.

Focus from Mesenteric Gland.—Four tubercle bacilli seen.

Tubercle from Suprarenal Body.—Four tubercle bacilli seen.

Animals Inoculated.

One calf, No. 1259, was inoculated subcutaneously with 20·0 cc. of the emulsion made from the left prescapular gland.

Rabbits 1396–1397 were subcutaneously inoculated with the same emulsion. They were killed after 119 days and showed slight tuberculosis.

CALF 1259. Virus H. 79. "J.N."

Subcutaneous inoculation of an emulsion of the left prescapular gland from Calf 1227

Dose—20·0 cc. of the emulsion, which contained numerous tubercle bacilli.

Date of Inoculation—July 24, 1907. [Age about 14 weeks.]

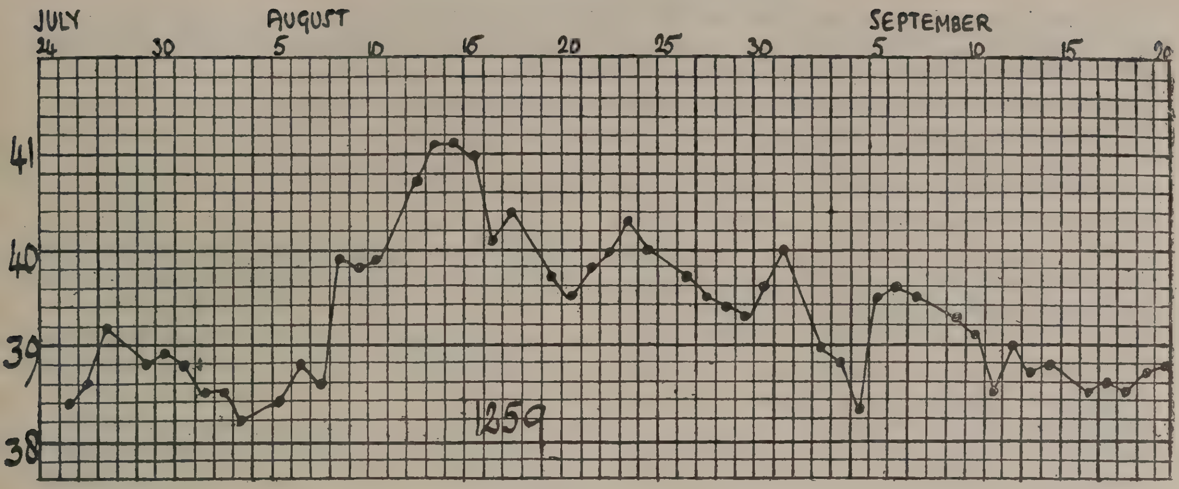
Killed when well—October 16, 1907. [84 days after inoculation.]

Clinical Notes.

A firm flat tumour developed at the seat of inoculation on the right side of the neck, and the adjacent prescapular gland became moderately enlarged.

About a month after inoculation the calf appeared somewhat unwell and continued so for several weeks; the temperature was high (40·0° C.—41·0° C.) during part of the third and fourth weeks, and afterwards slowly returned to the normal; as the temperature fell (*see* chart) the calf improved in health and general condition, and it was quite well when killed, 12 weeks after the inoculation.

Temperature. (Chart to September 20.)



From September 20 to October 16, when the calf was killed, the temperature was approximately normal.

Tuberculin Test.

The calf was not tested subsequent to inoculation.

Weights.

	cwt.	qrs.	lbs.
July 24, 1907	1	1	4
October 16, 1907	1	2	24

Total gain of weight.—1 qr. 20 lbs.

Average rate of gain per week.—4 lbs.

POST-MORTEM EXAMINATION.

Carcass in good condition.

Local Lesion.—In the subcutaneous tissues on the right side of the neck there was a flat tumour measuring 10 by 6·5 by 1·5 cm., composed of dense caseo-calcareous substance penetrated by trabeculae of fibrous tissue.

Right Prescapular Gland.—The right prescapular gland measured 6 by 4·5 by 1·5 cm.; on section it was irregularly caseo-calcareous, about two-thirds of the gland substance being replaced, the rest showing scattered discrete tubercles; the capsule was thickened where the gland was most affected.

Left Prescapular Gland.—The left prescapular gland measured 4 by 2·4 by 1 cm. and was normal on section.

Prepectoral and Axillary Glands.—Normal.

Cervical Glands.—On the right side one of the lower cervical glands contained two pea-sized calcareo-caseous nodules; one in the middle of the neck showed a few calcareous tubercles.

The superior cervical gland 1·5 cm. in diameter showed one-third of its substance replaced by a calcareo-caseous mass.

The large gland near the mastoid process had a small calcareous patch in the cortex.

The left cervical glands were normal.

Thorax.

Pleura.—Normal.

Lungs.—The lungs were crepitant except for a few collapsed lobules in the ventral borders; they contained very sparsely scattered calcareous tubercles similar to those in the liver.

Thoracic Glands.—The bronchial and mediastinal glands, though not enlarged, contained rather numerous calcareous tubercles and irregular calcareous patches formed by confluent tubercles.

Abdomen.

Omentum and Peritoneum.—Normal.

Liver.—In the substance of the liver there were sparsely scattered tubercles with calcareous centres and grey margins; the largest was about a millimetre in diameter.

Portal Glands.—The portal glands were rather large; on section they contained scattered calcareous foci.

Pancreatic and Renal Glands.—There were a few similar foci in the pancreatic and renal glands.

Spleen.—No tubercles were seen in the spleen.

Kidneys.—Normal.

Suprarenal Bodies.—There were seven miliary tubercles in the cortex of the right suprarenal body and three in that of the left; the tubercles had calcareous centres and grey fibrous margins.

Iliac Glands.—Normal.

Lumbar Glands.—Two contained each one calcareous grain.

Alimentary Tract.

Tongue, Pharynx, Palate, Tonsils; Submaxillary Retro-pharyngeal, Hyoid, and Parotideal Glands Intestines.—Normal.

Mesenteric Glands.—All the mesenteric glands showed in the cortex scattered yellow calcareous tubercles ranging in size from a grain of sand to that of a millet seed.

Ileo-colic Glands.—There were similar tubercles in the ileo-colic glands and a few small calcareous patches formed by confluent tubercles.

Testicles.—Normal.

Various Lymphatic Glands.

Precrural.—The right precrural gland contained a pin-head sized calcareous tubercle; the left a yellow calcareous tubercle the size of a millet seed.

Popliteal, Gluteal, Ischiatic and Pudic.—Normal.

Microscopical Examination.

Emulsion of Right Prescapular Gland.—Tubercle bacilli moderately numerous.

Emulsion of Bronchial and Mediastinal Glands.—Tubercle bacilli very scanty.

Tubercle from Precrural Gland.—Tubercle bacilli in moderate numbers.

Animals Inoculated.

Four guinea-pigs, Nos. 2633–2636, were inoculated intraperitoneally with an emulsion made from the right prescapular gland. All were killed after 27 days and showed early general tuberculosis.

Two guinea-pigs, Nos. 2637–2638, were inoculated intraperitoneally with an emulsion made from the left bronchial and long mediastinal glands. They were killed after 22 days and showed early general tuberculosis.

CALF 1297. Virus H. 79. "J.N."

Subcutaneous inoculation of an emulsion made from various tissues (the omentum, the pyloric portal and sternal glands, and (except in one case) the spleen) of each of four guinea-pigs, Nos. 2633–2636, inoculated with the right prescapular gland from Calf 1259.

Dose—20·0 cc. Tubercle bacilli were not numerous in the emulsion.

Date of Inoculation—November 12, 1907. [Age about 5 months.]

Killed when in good health—April 16, 1908. [156 days after inoculation.]

Clinical Notes.

A firm, prominent tumour developed at the seat of inoculation on the left side of the neck; on December 5, three weeks after inoculation, it measured 15 by 7 cm. Subsequently it became less firm and diminished in size.

The left prescapular gland became considerably enlarged, and measured 10 cm. in length on December 5; it afterwards diminished in size.

The calf remained well during the experiment, except for the constitutional disturbance which accompanied the rise of temperature.

Temperature.

Eleven days after inoculation the temperature rose to 40·3°C. and reached a maximum of 41·0°C. on the 16th day; it then slowly fell, and was normal on the 28th day; subsequently the temperature remained normal.

Tuberculin Test.

February 21, 1908. [101 days after inoculation.] No reaction (?). Rise of temperature, 0·5°C.

Weights.

	cwt.	qr.	lbs.
November 12, 1907 ...	1	2	8
April 16, 1908	2	3	18

Total gain of weight.—1 cwt. 1 qr. 10 lbs.

Average rate of gain per week.—6·9 lbs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—In the subcutaneous tissues on the left side of the neck there was a cystic tumour, measuring 6·5 by 4·5 by 2·5 cm.; on section it had very thick fibrous walls, specially thick at one extremity, and yellow tenacious purulent contents. The skin over the tumour was much thickened.

Left Prescapular Gland.—The left prescapular gland measured 6 by 3 by 1·5 cm. It showed on section two calcareous nodules each about 1·5 cm. in greatest diameter.

Right Prescapular Gland.—The right prescapular gland measured 6 by 2·5 by 1 cm. and was normal on section.

Cervical Glands.—On the left side about the middle of the neck there was a chain of four enlarged glands; two measured 2 by 1 by 1 cm., the others were quite small; the two larger ones were very hard, and on section fibro-calcareous practically throughout; the two small ones each had a calcareous patch in the cortex. Just within the entrance to the thorax on the left side there was a gland with a calcareous nodule 5 mm. in diameter, and adjacent to it a pea-sized gland fibro-calcareo-caseous throughout.

On the right side, one slightly enlarged mid-cervical gland was partly calcareo-caseous.

Axillary and Prepectoral Glands.—Normal.

All the remaining lymphatic glands and the organs were examined and found healthy.

Microscopical Examination.

Emulsion of Left Prescapular Gland.—A few tubercle bacilli seen.

Emulsion of a Left Cervical Gland.—A moderate number of tubercle bacilli seen.

CALF 1305. Virus H. 79. "J.N."

Subcutaneous inoculation of an emulsion made from various tuberculous tissues of Guinea-pigs 2697 and 2698. (The virus was derived from the thoracic glands of Calf 1259 through two series of guinea-pigs.)

Dose—20·0 cc. The emulsion contained moderately numerous tubercle bacilli.

Date of Inoculation—November 27, 1907. [Age about 18 weeks.]

Killed when in good health—April 16, 1908. [141 days after inoculation.]

Clinical Notes.

A small prominent tumour developed at the seat of inoculation and the left prescapular gland became moderately enlarged.

The calf remained well during the experiment.

Temperature.

On the 7th day the temperature rose to 39·8° C., and it reached a maximum of 40·6° C. on the 17th day. On the 30th day the temperature had fallen to the normal, and it remained approximately normal subsequently.

Tuberculin Test.

February 21, 1908. [86 days after inoculation.] Slight reaction (?). Rise of temperature, 0·6° C.

Weights.

	cwt.	qrs.	lbs.
November 27, 1907	1	2	5
April 16, 1908	2	2	1

Total gain of weight.—3 qrs. 24 lbs.

Average rate of gain per week.—5·4 lbs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—At the seat of inoculation there was a prominent circumscribed tumour measuring 6 by 4·5 by 3 cm.; on section the tumour was situated wholly in the subcutaneous tissues and was composed of a mass of dense caseated tissue separated from a thick fibrous capsule by yellow caseo-pus; the capsule was in places 8 mm. thick and showed scattered calcareous foci; it was adherent to the fibrous aponeurosis of the muscles and to the skin which was thickened.

Left Prescapular Gland.—The left prescapular gland measured 5·5 by 3 by 1·5 cm.; on section it showed three brownish fibrous patches; one was 1·5 cm. in diameter and contained softened calcareous grains and a hemp-seed-sized softened caseous nodule, the others were much smaller and showed sparsely scattered calcareous foci.

Right Prescapular Gland.—The right prescapular gland measured 5 by 2·5 by 1 cm. and was normal on section

Cervical Glands.—One of the lower cervical glands on the left side contained a calcareous nodule 5 mm. in diameter; the rest were normal.

Prepectoral and Axillary Glands.—Normal.

Thorax.

Pleura, Lungs, Heart.—Normal.

Thoracic Glands.—The bronchial and dorsal mediastinal glands were normal in size; they contained, with the exception of one or two of the small dorsal mediastinal glands, sparsely scattered irregular yellow calcareous foci.

All the remaining organs and glands were examined and found healthy.

Microscopical Examination.

Emulsion of Left Prescapular Gland, No. I. (soft caseous nodule).—Tubercle bacilli moderately numerous.

Emulsion of Left Prescapular Gland, No. II. (small fibrous patch).—Few tubercle bacilli seen.

Emulsion of the Left Bronchial and Long Mediastinal Glands.—No tubercle bacilli seen.

Animal Inoculated.

One guinea-pig, No. 3029, was inoculated intraperitoneally with the emulsion made from a piece of the left bronchial gland and a small piece of the long mediastinal gland. It was killed after 42 days, and showed general tuberculosis.

CALF 1433. Virus H. 79. "J.N."

Subcutaneous inoculation of culture derived from the thoracic glands of Calf 1305 through Guinea-pig 3029.

Dose—82·0 milligrammes.

Date of Inoculation—September 4, 1908. [Age about 6 months.]

Killed when in good health—December 11, 1908. [98 days after inoculation.]

Clinical Notes.

A small fluctuating tumour developed at the seat of inoculation and the adjacent prescapular gland became slightly enlarged. The calf remained well.

Temperature.

There was a period of slight irregular pyrexia commencing on the 11th day after inoculation and lasting 16 days; the highest temperature was 40·1° C., the lowest 38·3° C. Subsequently the temperature was normal.

Tuberculin Test.

November 4, 1908. [61 days after inoculation.] Dose, 2·0 cc. Reacted. Rise of temperature, 1·1° C.

Weights.

	cwt.	qrs.	lbs.
September 4, 1908	1	3	11
December 11, 1908	2	1	12

Total gain of weight.—2 qrs. 1 lb.

Average rate of gain per week.—4·0 lbs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—At the seat of inoculation on the left side of the neck there was a prominent circumscribed cystic swelling, measuring 6 by 5 by 4 cm., containing thick caseo-pus and breaking-down caseous masses.

Left Prescapular Gland.—The left prescapular gland measured 5 by 3 by 1·2 cm.; one-half of the gland was slightly enlarged and this showed on section caseous gritty areas ranging from 0·5 cm. to 1·8 cm. in greatest diameter, the larger ones being partly softened.

Right Prescapular Gland.—The right prescapular gland measured 4·3 by 2 by 1 cm. and was normal on section.

Other glands and all the organs were examined and found normal.

CALF 1243. Virus H. 79. "J.N."

Subcutaneous inoculation of an emulsion made from the spleen of Dog 31 (infected with culture derived from the human lung).

Dose—20·0 cc. of the emulsion in which tubercle bacilli were very numerous.

Date of Inoculation—April 24, 1907. [Age about 11 weeks.]

Killed when in fairly good health—June 1, 1907. [38 days after inoculation.]

Clinical Notes.

A large tumour quickly developed at the seat of inoculation on the left side of the neck, and the adjacent prescapular gland became considerably enlarged.

On May 6, 12 days after inoculation, the temperature rose to 40·4° C., and on May 8, 14 days after inoculation, the calf was noticed to be unwell; it looked thin and dejected, and was "off its food." On May 10, two days later, the animal appeared to be seriously ill: it stood with head bent down, and was thin, with sunken flanks; its general appearance was similar to that of animals affected with acute tuberculosis.

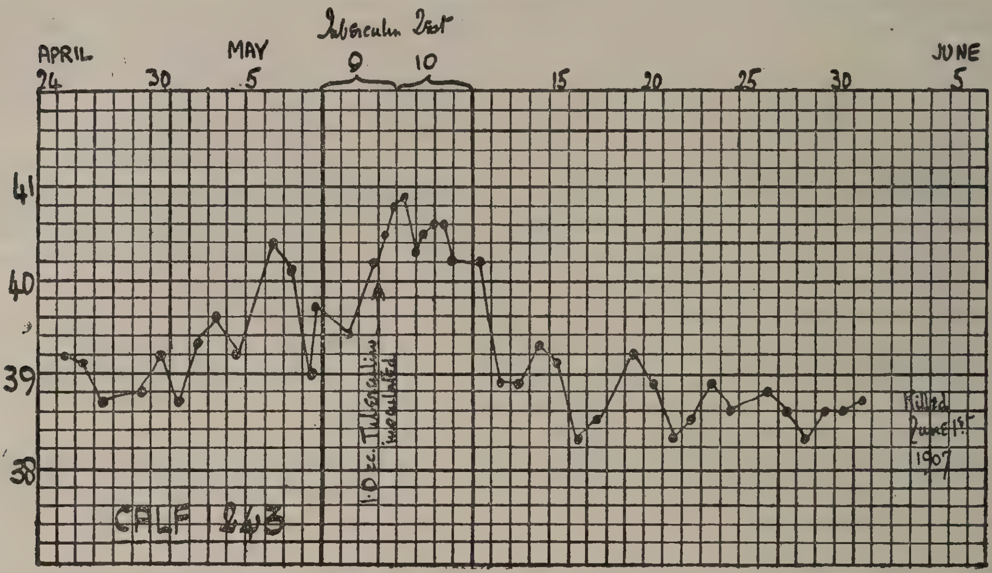
On May 13 the temperature had fallen to the normal, and there was distinct improvement in the condition of the animal.

Up to May 16 the tumour at the seat of inoculation continued to increase in size. On this date it was prominent, measuring about 18 by 12 cm., was situated just in front of the shoulder and concealed the prescapular gland. Towards the front part was a small ulcerous opening in the skin through which clear serous fluid exuded. There was slight oedema of the dewlap. The prescapular gland was much enlarged, but could not be measured on account of the situation of the tumour. The calf was still thin, and had a rough coat, but its general condition was fair and continued steadily to improve.

From May 16 to 31 the improvement continued, and on the latter date the calf appeared to be quite recovered, and was in fairly good condition.

The discharge from the local tumour, noted on May 16, continued during the latter half of the month, thick caseo-pus being exuded daily until the calf was killed on June 1, 38 days after inoculation.

Temperature.



Tuberculin Test.—May 9. [15 days after inoculation.] Slight reaction. The temperature was high (40·2° C.) before the injection of tuberculin ; a rise of 0·7° C. followed the injection.

Weights.

The animal was not weighed during the experiment, but from its appearance it undoubtedly lost considerably in weight during the first fortnight, and gained weight rapidly during the remaining period.

	cwt.	qrs.	lbs.
April 24, 1907	1	0	3
June 1, 1907	1	0	27

Total gain of weight.—24 lbs.

POST-MORTEM EXAMINATION.

The carcass was in moderately good condition.

Local Lesion.—At the seat of inoculation on the left side of the neck there was an elongated flattened tumour, measuring 12 by 8 cm. in superficial area ; on section it was found to be a collapsed abscess filled with a loose sequestrum of yellow breaking-down caseo-necrotic substance ; the walls were composed of translucent fibroid tissue, 5 mm. in greatest thickness, showing yellow radial streaks, and lined internally with pale granulation tissue covered with pus ; the cavity was crossed by a few trabeculae of fibrous tissue ; the skin towards the upper part showed a circular punched out ulcer 2·5 cm. in diameter with smooth inverted edges, from under which there was a discharge of pus. The ulcer communicated with the cavity and its floor was formed by the caseous sequestrum.

In the muscles under the tumour there were a number of miliary grey tubercles with opaque centres, and an irregular dense caseous mass with a translucent fibrous margin.

Left Prescapular Gland.—The left prescapular gland measured 8 by 5 by 4 cm. ; on section the cortex of the gland was composed practically throughout of homogenous pinkish yellow caseo-necrotic substance containing here and there minute opaque foci and streaks of beginning calcification ; in the medulla of the gland there were a few small caseous foci and patches ; the capsule of the gland was greatly thickened.

Right Prescapular Gland (4·5 by 2 by 1 cm.).—Normal.

Left Prepectoral Glands.—The left prepectoral glands were enlarged ; the rounded gland showed in the cortex a congested yellow caseous patch ; the reniform gland was much enlarged and firmer than normal, but showed no caseous foci.

Left Cervical Glands.—A mid cervical gland slightly enlarged contained a small patch of early caseation in the cortex. Other left cervical glands appeared normal.

Right Prepectoral, Right Cervical, and Axillary Glands.—Normal.

Thorax.

Pleura.—Normal.

Lungs.—The lungs were pinkish and crepitant, and collapsed normally ; the caudal lobes showed under the pleura fairly numerous reddish grey foci ranging from a mere point up to about 2 mm. (or rather more) in diameter ; the larger foci were very irregular in outline and appeared in some cases to be produced by the aggregation of several small ones ; similar foci were seen on section, chiefly on the surface of the lobules ; there were similar foci in the cephalic lobes, but not so numerous as in the caudal.

Thoracic Glands.—The bronchial and mediastinal glands appeared normal.

Heart.—Normal.

Abdomen.

Omentum and Peritoneum.—Normal.

Spleen.—The spleen was normal in size ; the Malpighian bodies were conspicuous ; there were no tubercles.

Liver.—On the surface there were a few greyish and greyish white spots which on section were found to be merely slight thickenings of the capsule : on section two doubtful yellow points were seen in the depth.

Portal Glands.—Normal.

Kidneys.—The right kidney showed on the surface nine translucent grey tubercles varying in size from a mere point up to 1 mm. in diameter; a few tubercles were seen in the depth of the cortex, one of which had a minute central opacity.

The left kidney showed about half a dozen grey tubercles on the surface, and one or two in the depth of the cortex; in the medulla of this kidney two translucent grey tubercles, the larger the size of a millet seed, were found.

Suprarenal Bodies.—Each contained two or three minute grey tubercles in the cortex.

Renal, Lumbar, and Iliac Glands.—Normal.

Alimentary Tract.

Tongue, Pharynx, Palate, Tonsils.—Normal.

Pharyngeal, Submaxillary, Hyoid, and Parotideal Glands.—Normal.

Intestines.—Normal.

Mesenteric Glands.—A few of the glands contained one or two irregular yellow foci and tubercles.

Ileo-colic Glands.—The ileo-colic glands showed similar foci, and in places a fine yellow network.

Testes.—Normal.

Various Lymphatic Glands.

Precrural, Popliteal, Gluteal, Ischiatic, Pudic.—Normal.

Microscopical Examination.

Emulsion of Prescapular Gland.—Tubercle bacilli fairly numerous.

Popliteal Gland (scraping from).—No tubercle bacilli.

Suprarenal (tubercle from).—One tubercle bacillus seen.

Lung (tubercle from).—One tubercle bacillus seen.

Liver (focus from).—No tubercle bacilli.

Animals Inoculated.

One calf, No. 1225, was inoculated subcutaneously with 20·0 cc. of an emulsion made from the left prescapular gland.

Three rabbits were inoculated subcutaneously. No. 1321 was inoculated with an emulsion of the prescapular gland (dose 5·0 cc.) and died in 4 days; no cause of death was found.

No. 1319 was inoculated with an emulsion of spleen, and No. 1320 with an emulsion of lung; they were killed after 128 days and showed slight tuberculosis.

Six guinea-pigs were inoculated intraperitoneally. Nos. 2464 and 2465 inoculated with an emulsion of the prescapular gland died in 29 and 21 days of general tuberculosis.

Nos. 2460 and 2461 inoculated with an emulsion of spleen were killed after 109 days and showed chronic general tuberculosis.

Nos. 2462 and 2463 inoculated with an emulsion of lung died in 86 and 93 days of general tuberculosis.

CALF 1225. Virus H. 79. "J.N."

Subcutaneous inoculation of an emulsion made from the left prescapular gland of Calf 1243.

Dose—20·0 cc. of emulsion containing fairly numerous tubercle bacilli.

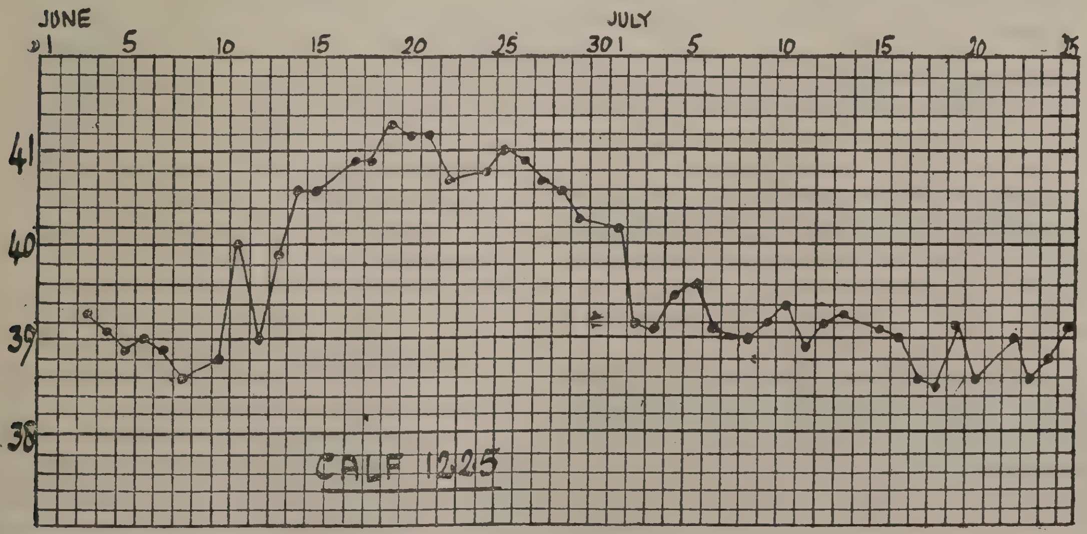
Date of Inoculation—June 1, 1907. [Age about 15 weeks.]

Killed when in good health—August 23, 1907. [83 days after inoculation.]

Clinical Notes.

The development of the tumour at the seat of inoculation, and of the adjacent prescapular gland, was similar to that frequently seen with viruses of slight virulence for bovines. The calf suffered from constitutional disturbance during the period of high temperature (see chart) but quickly recovered, and was in good health and grew rapidly during the latter half of the period covered by the experiment.

Temperature. (Chart to July 25.)



From July 25 to August 23 the temperature was approximately normal.

Tuberculin Test.—The calf was not tested subsequent to inoculation.

Weights.

	cwt.	qrs.	lbs.
June 1, 1907	1	1	7
August 23, 1907	1	3	26

Total gain of weight.—2 qrs. 19 lbs.

Average rate of gain per week.—6·2 lbs.

POST-MORTEM EXAMINATION.

Carcass.—In good condition.

Local Lesion.—At the seat of inoculation on the left side of the neck there was a very large fluctuating tumour measuring 20 by 12 by 6 cm. On section it was a fibrous-walled cyst filled with thick creamy caseo-pus containing several firm caseous masses; the cavity of the cyst was crossed by fibrous trabeculae and was lined internally with granulation tissue.

Left Prescapular Gland.—The left prescapular gland was much enlarged, measuring 11 by 6·5 by 4 cm.; on section more than three-quarters of the gland substance was replaced by softened caseous material contained in cavities surrounded by dense fibrous tissue, in places forming large masses.

Right Prescapular Gland.—The right prescapular gland measured 4·5 by 2 by 1 cm. and was normal on section.

Prepectoral Glands.—One on the left side, the size of a thrush's egg, was three-quarters caseous and softened. The rest were normal.

Axillary Glands.—Normal.

Thorax.

Pleura.—Normal.

Lungs.—The lungs were crepitant throughout; they showed under the pleura numerous irregular reddish or reddish-grey spots, some obviously haemorrhagic others of a doubtful nature, and about half-a-dozen caseous tubercles with grey margins the largest the size of a millet seed.

Thoracic Glands.—Two dorsal mediastinal glands each showed in the cortex a yellow caseous focus; in the left bronchial gland there were three caseous foci; other thoracic glands were normal.

Heart.—Normal.

Abdomen.

Omentum and Peritoneum, Spleen, Liver, Kidneys and Suprarenal Bodies.—Normal.

Portal, Coeliac, Renal, Lumbar and Iliac Glands.—Normal.

Alimentary Tract.

Tongue, Pharynx, Palate, Tonsils.—Normal.

Submaxillary, Pharyngeal, Hyoid, and Parotideal Glands.—Normal.

Intestines.—Normal.

Mesenteric Glands.—Three small caseous tubercles and a pea-sized gritty caseous nodule were found in the mesenteric glands. A culture was isolated from the caseous nodule and this was found on investigation to have the cultural characters and virulence of the avian tubercle bacillus.

Ileo-colic Glands.—One contained a minute caseous focus.

Testicles.—Normal.

Eyes.—Normal.

Various Lymphatic Glands.

Precrural and Popliteal.—Normal.

Gluteal and Ischiatic.—Normal.

Pudic.—Normal.

Microscopical Examination.

Mesenteric Gland (small tubercle).—A few tubercle bacilli seen.

Mesenteric Gland (nodule).—Tubercle bacilli.

Prescapular Gland (emulsion).—Tubercle bacilli moderately numerous.

Prepectoral Gland (smear from).—Tubercle bacilli.

Animals Inoculated.

Calf 1277 was subcutaneously inoculated with 20·0 cc. of an emulsion made from the left prescapular gland.

Rabbits 1471 and 1472 were subcutaneously inoculated each with 3·0 cc. of the same emulsion. They were killed after 216 days and showed very slight tuberculosis.

CALF 1277. Virus H. 79. "J.N."

Subcutaneous inoculation of an emulsion made from the left prescapular gland of Calf 1225.

Dose—20·0 cc. [Tubercle bacilli moderately numerous.]

Date of Inoculation—August 23, 1907. [Age about 13 weeks.]

Killed when well—November 29, 1907. [98 days after inoculation.]

Clinical Notes.

A firm tumour of moderate size developed at the seat of inoculation on the left side of the neck and the adjacent prescapular and prepectoral glands became slightly enlarged. The calf remained in good health during the experiment.

Temperature.

The temperature was a little raised and irregular from the 13th to the 25th day after inoculation (a period of 12 days); the highest temperature recorded was 40·0° C. on the 15th day. Subsequently the temperature was normal.

Tuberculin Test.

October 24. [62 days after inoculation.] Reacted. Rise of temperature, 0·9° C.

Weights.

	cwt.	qr.	lbs.
August 23, 1907	1	0	21
November 29, 1907	2	0	5

Total gain of weight.—3 qrs. 12 lbs.

Average rate of gain per week.—7 lbs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion—At the seat of inoculation on the left side of the neck there was a tense circumscribed swelling measuring 7 by 6·5 by 4 cm. On section it was partly composed of creamy caseo-pus and partly of fibrous tissue closely beset with caseo-calcareous patches; the tumour was surrounded by a capsule of fibrous tissue and the skin over it was thickened.

Left Prescapular Gland.—The left prescapular gland measured 5 by 3 by a little more than 1 cm.; it showed in the cortex a calcareous patch about 2 cm. in greatest diameter and two or three small calcareous nodules.

Right Prescapular Gland.—The right prescapular gland measured 5 by 2 by 1 cm. and was normal on section.

Prepectoral Glands.—The rounded prepectoral gland on the left side, 1·3 cm. in diameter, showed about three quarters of its substance caseo-calcareous. Other prepectoral glands were normal.

Cervical and Axillary Glands.—Normal.

Thorax.

Pleura, Thoracic Glands, Heart.—Normal.

Lungs.—One minute grey tubercle was seen under the pleura of one of the lobes of the lung.

All the remaining organs and glands of the body were examined and found normal.

Microscopical Examination.

Emulsion of Prescapular and Prepectoral Glands.—Tubercle bacilli in moderate numbers.

Tubercle from Lung.—No tubercle bacilli.

Guinea-pigs Inoculated.

Three guinea-pigs, Nos. 2802, 2803 and 2804, were inoculated intraperitoneally with an emulsion made from the tuberculous patches in the left prescapular and prepectoral glands. They were killed after 31 days and showed early general tuberculosis.

CALF 1325. Virus H. 79. "J.N."

Intravenous and subcutaneous inoculation of an emulsion of tuberculous tissues from Guinea-pigs 2802, 2803, 2804, inoculated with an emulsion of prescapular and prepectoral glands from Calf 1277.

Dose { 10·0 cc. intravenously
10·0 cc. subcutaneously } Tubercle bacilli were not very numerous in the emulsion.

Date of Inoculation—December 30, 1907. [Age about 13 weeks.]

Killed when in good health—July 16, 1908. [199 days after inoculation.]

Clinical Notes.

10·0cc. of the emulsion were inoculated intravenously; as the animal then had respiratory difficulty, it was thought inadvisable to inject the remainder of the dose intravenously; 10·0 cc. were therefore inoculated subcutaneously.

There was some slight increase in respiration commencing shortly after inoculation, and lasting about three weeks; the general health of the calf was unaffected.

Temperature.

On the fifteenth day after inoculation the temperature rose to 39·8° C. and it reached 41·2° C. on the 18th day. During the following three weeks the temperature fell steadily. On February 7, 39 days after inoculation, it was normal (39·0° C.), and it remained normal for five months—until the animal was killed in July.

Tuberculin Tests.

February 21, 1908. [53 days after inoculation.] Dose, 1·0 cc. Reacted. Rise of temperature, 1·8° C.

March 4, 1908. [65 days after inoculation.] Dose, 1·0 cc. Reacted. Rise of temperature, 1·1° C.

May 20, 1908. [142 days after inoculation.] Dose, 2·0 cc. Reacted. Rise of temperature, 1·1° C.

Weights.

	cwt.	qr.	lbs.
December 30, 1907	1	0	19
July 16, 1908	1	3	8

Total gain of weight.—2 qrs. 17 lbs.

Average rate of gain per week.—2·5 lbs.

POST-MORTEM-EXAMINATION.

The carcass was in very good condition.

Local Lesion.—At the seat of inoculation on the left side of the neck there was a small prominent fluctuating swelling measuring 5·5 by 4 by 2 cm.; on section it was a cyst with caseo-purulent contents and thick fibrous walls.

Left Prescapular Gland.—The left prescapular gland was slightly larger than the right; it showed in the cortex two calcareous nodules, the largest the size of a pea.

Right Prescapular Gland.—The right prescapular gland measured 4 by 1·8 by 1 cm., and was normal on section.

Prepectoral, Axillary and Cervical Glands.—Normal.

Thorax.

Lungs.—The lungs were crepitant throughout; in the right caudal lobe there was a very hard irregular calcareous nodule about 5 mm. in greatest diameter. Elsewhere two minute calcareous tubercles and a few minute grey points of a doubtful nature were seen.

Thoracic Glands.—The bronchial and mediastinal glands were not enlarged; they showed on section small calcareous patches scattered about in the depth of the cortex.

All the remaining organs and glands of the calf were examined and found healthy.

Microscopical Examination.

Emulsion of Bronchial Gland.—A few tubercle bacilli seen.

Emulsion of Prescapular Gland.—A few tubercle bacilli seen.

Emulsion of Mediastinal Gland.—A few tubercle bacilli seen.

Animals Inoculated.

Guinea-pigs 3158 and 3159 were inoculated intraperitoneally with an emulsion made from the left bronchial gland; and Guinea-pig 3157 intraperitoneally with an emulsion made from the spleen. The two former died of general tuberculosis in 46 and 59 days; the latter was found healthy when killed after 74 days.

CALF 1479. Virus H. 79. "J.N."

Subcutaneous inoculation of culture derived from the left bronchial gland of Calf 1325, through Guinea-pig 3158.

Dose—100·0 milligrammes.

Date of Inoculation—October 30, 1908. [Age six months.]

Killed when in good health—February 23, 1909. [116 days after inoculation.]

Clinical Notes.

The calf remained well during the experiment.

Temperature.

During the first four weeks after inoculation the temperature was raised; it rose gradually until the end of the second week, when 40·9° C. was recorded, and then slowly returned to the normal. Subsequently the temperature remained normal.

Tuberculin Test.

January 7, 1909. [69 days after inoculation.] Dose, 2·0 cc. Reacted. Rise of temperature, 1·5° C.

Weights.

	cwt.	qr.	lbs.
October 30, 1908	2	1	22
February 23, 1909	3	0	16

Total gain of weight.—2 qrs. 22 lbs.

Average rate of gain per week.—4·7 lbs.

POST-MORTEM EXAMINATION.

The carcass was fat.

Local Lesion—At the seat of inoculation on the left side of the neck there was a prominent fluctuating tumour measuring 9 by 7 by 5 cm.; on section it was a thin-walled cyst containing caseo-pus and a solid caseous sequestrum; the skin over it was much thickened.

Left Prescapular Gland.—The left prescapular gland measured 5·7 by 3 by 2·5 cm. and showed about half its substance replaced by two dense caseous slightly gritty masses, beginning to soften in the centre.

Right Prescapular Gland.—The right prescapular gland measured 5·5 by 2·5 by 1·4 cm. and was normal on section.

Prepectoral Glands.—On the left side one 2 cm. in diameter was dense and caseous practically throughout; the caseous substance was slightly gritty from calcification.

Thorax.

Lungs.—Normal.

Thoracic Glands.—The dorsal mediastinal and bronchial glands were not enlarged. They showed on section moderately numerous small calcareous patches, situated in the depth of the cortical substance and separated from the capsule by normal gland tissue.

Heart and Pleura.—Normal.

Abdomen.

Omentum and Peritoneum, Spleen, Liver and Portal Glands, Kidneys.—Normal.

Suprarenal Bodies.—The left suprarenal body contained about a dozen calcareous tubercles the largest 2 mm. in diameter; there was a smaller number of similar tubercles in the right suprarenal.

Renal Glands.—Two renal glands each showed scattered gritty foci.

Pancreatic Glands.—Two glands on the pancreas showed a few calcareous foci.

Iliac Glands.—One iliac gland contained a caseous gritty tubercle.

Mammary Gland.—Normal.

Supramammary Lymphatic Glands.—In the cortex of one there was a minute calcareous grain.

Alimentary Tract.

Tongue, Pharynx, Tonsils; Submaxillary and Retropharyngeal Glands, Intestines.—Normal.

Mesenteric Glands.—All the mesenteric glands showed in their cortices discrete irregular calcareous tubercles; in some of the glands they were moderately numerous.

Ileo-colic Glands.—There were similar tubercles in the ileo-colic glands.

All the peripheral lymphatic glands not hitherto mentioned were normal.

Animals Inoculated.

Guinea-pigs inoculated with turbid fluid recovered from the mamma of the calf after the injection of salt solution into the milk sinuses.

Fluid from the two fore quarters.	3566.	Intrap.	Small dose.
	3567.	„	„
Fluid from the two hind quarters.	3568.	Intrap.	Larger dose than the above.
	3569.	„	„

Guinea-pig 3568 died in 58 days, the rest were killed after 62 days; all showed general tuberculosis.

GOAT 59. [Adult Female.] Virus H. 79. "J.N."

Subcutaneous inoculation of culture derived from the human lung.

Dose—100·0 milligrammes.

Date of Inoculation—November 28, 1907.

Killed when in good health—March 13, 1908. [106 days after inoculation.]

ABSTRACT OF POST-MORTEM NOTES.

(For details *see* Report on the excretion of Tubercle Bacilli in Milk.)

There was a scar at the seat of inoculation and the subcutaneous tissues adjacent to it were beset with caseo-calcareous tubercles. The left prescapular gland was mainly occupied by a firm caseous slightly gritty mass. One miliary tubercle was seen in the liver and there were a few small grey tubercles in the kidneys. The mesenteric and ileo-colic glands contained in the cortex caseous slightly gritty patches or caseous tubercles. One iliac gland contained a caseous gritty patch and one submaxillary gland a caseous focus. There was no tuberculosis elsewhere.

DOG 31. [Young adult.] Virus H. 79. "J.N."

Intraperitoneal inoculation of culture derived from the human lung.

Dose—50·0 milligrammes.

Date of Inoculation—March 23, 1907.

Died—April 23, 1907. [31 days after inoculation.]

POST-MORTEM EXAMINATION.

The body was slightly thinner than at the beginning of the experiment.

Abdomen.

The peritoneal cavity contained about 800 cc. of yellow slightly turbid serous fluid containing a few small flakes of fibrin.

Omentum and Peritoneum. — The omentum was thickened and adherent to the floor of the abdomen along the mid line. On section the thickened portions were honeycombed with spaces filled with greenish yellow pus; in other parts of the omentum there were discrete tubercles and lines of thickening along the vessels.

The mesentery and meso-colon had an opaque milky appearance and were speckled with minute grey points.

On the parietal peritoneum there were no distinct tubercles, but by reflected light the membrane appeared finely roughened or granular.

Spleen.—The spleen was enormously swollen and measured 20 cm. in length; it was soft and red and the pulp was closely peppered with extremely minute grey points.

Liver.—The liver was soft yellow and mottled on the surface with patches and foci of congestion; on the surface numerous minute grey points could be seen, but none could be detected in the depth, probably on account of the yellow colour of the liver tissue.

Portal Gland.—The portal gland was slightly enlarged and showed patches of the cortex canary-yellow coloured but not abnormally firm (? early necrosis); there were no areas of softening.

Coeliac Gland.—The coeliac gland was enlarged and much of its substance converted into soft greenish-yellow pus.

Kidneys.—The capsules of the kidneys stripped badly. Each kidney showed on the surface of the cortex a few minute grey points, ? early tubercles.

Suprarenal Bodies.—Normal.

Iliac and Lumbar Glands.—One iliac gland showed in the cortex a canary-yellow necrotic partially softened patch. The lumbar gland resembled the coeliac.

Thorax.

The pleural cavities contained a small quantity of yellow serous fluid.

Pleura.—Normal.

Lungs.—The lungs collapsed normally and were slightly congested; they contained moderately numerous evenly distributed greyish submiliary tubercles.

Sternal Glands.—The sternal glands were much enlarged and advanced in necrosis, resembling the coeliac gland.

Bronchial Glands.—The bronchial glands appeared normal.

Heart. — The heart muscle contained scattered minute grey foci. Endocardium normal.

Alimentary Tract.

Tongue.—Normal.

Pharynx.—Normal.

Neck Glands.—The submaxillary and pharyngeal glands contained scattered yellow tubercles up to a pin's head in size. The cervical glands were normal.

Stomach and Intestine.—The contents of the stomach and intestines were black, apparently from digested blood. The mucous membrane of the gut was normal.

Mesenteric Glands.—These glands were not enlarged, but showed on section numerous yellow foci.

Inguinal Glands.—Normal.

Microscopical Examination.

(Smears from)—

Liver.—Tubercle bacilli very numerous.

Spleen.—Tubercle bacilli very numerous.

Omentum.—Tubercle bacilli very numerous.

Mesenteric Gland.—Tubercle bacilli numerous.

Submaxillary Gland.—Tubercle bacilli numerous.

Bone Marrow.—Tubercle bacilli numerous.

Blood.—Tubercle bacilli easily found; all that were seen were intracellular.

DOG 33. [Puppy.] Virus H. 79. "J.N."

Intraperitoneal inoculation of culture derived from the human lung.

Dose—10·0 milligrammes.

Date of Inoculation—March 23, 1907.

Died—April 24, 1907. [32 days after inoculation.]

POST-MORTEM EXAMINATION.

The body was thin.

Abdomen.

The peritoneal cavity contained a large quantity of clear straw coloured fluid.

Omentum and Peritoneum.—The omentum was much thickened and formed a firm somewhat lobulated mass which was slightly adherent to the floor of the abdomen along the mid line, it extended transversely from the pylorus where it had the greatest thickness to the dorsal extremity of the spleen.

On section it was composed of dense opaque whitish or yellowish-white necrotic areas separated by trabeculae of dense translucent grey tissue.

The mesentery and meso-colon presented numerous small translucent grey tubercles, and in places some rather larger nodules, containing yellow foci.

On the parietal peritoneum were fairly numerous minute slightly raised transparent tubercles; there were similar tubercles on the surface of the stomach and rectum.

Spleen.—The spleen was not apparently enlarged; it showed on the surface under the capsule a number of small irregular greyish or greyish-yellow patches of necrosis which on section were found to extend a short distance into the substance; in the depth of the spleen scattered congested yellowish or grey foci were seen.

Liver.—The liver was deeply congested and very closely beset with minute grey tubercles; they caused the surface of the liver to feel finely granular.

The Pyloric Gland, a centimetre in diameter, showed about three-quarters of its substance replaced by a dense creamy white necrotic mass.

The Coeliac Gland showed the major part of its cortex in a similar condition.

The Portal and Lumbar Glands were similarly but not so extensively affected.

An Iliac Gland showed a small patch of early necrosis in the cortex.

Kidneys.—In the cortex of each kidney there were two or three small grey translucent tubercles.

Mesenteric Glands.—Around the margins of the cortices of the mesenteric glands there were fairly numerous irregular greyish and greyish-white necrotic foci.

Similar foci were seen in the ileo-colic and colic glands.

Thorax.

There was no excess of fluid in the pleural cavities.

Pleura.—Normal.

Lungs.—The lungs were crepitant throughout and only slightly congested; they were moderately closely beset with grey tubercles varying in size up to a millimetre in diameter; many of the larger ones showed a minute whitish focus in the centre.

Bronchial Glands.—The bronchial glands were slightly enlarged and showed early tuberculosis of the cortex; an inter-tracheo-bronchial gland was more advanced and resembled the portal.

Sternal Glands.—The sternal glands were much enlarged and were composed throughout of dense creamy-white necrosed tissue.

Heart.—Normal.

Tongue, Pharynx, Palate.—Normal.

Peripheral Lymphatic Glands.—Normal.

Microscopical Examination.

(Smears from)—

Liver.—Tubercle bacilli fairly numerous.

Spleen.—Tubercle bacilli fairly numerous.

Sternal Gland.—Tubercle bacilli numerous.

Pudic Gland (scraping from apparently normal Gland).—Tubercle bacilli scanty.

Marrow.—Tubercle bacilli scanty.

Blood.—No tubercle bacilli seen.

CAT 37. Virus H. 79. "J.N."

Intraperitoneal inoculation of culture derived from the human lung direct.

Dose—50·0 milligrammes.

Date of Inoculation—March 23, 1907.

Died—May 18, 1907. [56 days after inoculation.]

Weights.

	grammes.
March 23, 1907	2150
May 18, 1907	1170

Loss of weight: 980 grammes.

POST-MORTEM EXAMINATION

Abdomen.

Local Lesion.—There was a narrow elongated caseating patch in the subperitoneal tissues along the mid line of the abdomen.

Omentum.—The omentum was not contracted and showed a network of grey lines, apparently slightly thickened lymphatic vessels.

Abdominal Lymphatic Glands.—The pyloric and the portal glands seemed enlarged, but showed no sign of caseation.

Spleen.—The spleen (? enlarged) was dark red and firm, and showed on section grey foci (Malpighian bodies), but no definite tubercles.

Liver.—The liver showed near the thin margin of one of the lobes a yellow caseous softened mass, lobular in outline, measuring 1·5 by 1 by 1 cm. On the surface of the liver in the neighbourhood of this nodule, as well as on the surface of the other lobes, were dilated tortuous varicose veins, many filled with pale tough clot. The capsule of the liver had in places a finely roughened appearance; in the substance a few minute grey points of a doubtful nature were seen.

Kidneys.—The right kidney showed on the surface two slightly projecting grey caseating nodules up to 2 mm. in diameter; these on section were seen to extend through the cortex and slightly into the medulla, and were wedge-shaped in outline; on the surface were seen also half a dozen greyish or greyish-white miliary tubercles which penetrated the substance in some cases somewhat deeply. In the depth of the kidney three firm caseating nodules up to a hempseed in size, and a fews maller foci (some grey and others caseous) were seen. The left kidney showed rather numerous tubercles ranging in size up to 2 mm. in diameter similar to those in the right; in the medulla there were two or three caseous nodules and a few caseous streaks. There was no pus in the pelvis of either kidney.

Suprarenal Bodies.—These appeared normal.

Thorax.

Pleura.—Normal.

Lungs.—The lungs were crepitant and collapsed normally.

In the right cephalic lobe there were five, and in the left caudal two, caseous nodules up to a pea in size, which readily shelled out from a thin fibrous capsule. All the lobes showed just under the capsule and chiefly on the dorsal surfaces particularly of the posterior parts of the caudal lobes, scattered opaque whitish foci up to a pin's head, and a few translucent greyish tubercles; on the dorsal surface of each caudal lobe, near the posterior tip, there was a small grey patch composed of confluent grey tubercles; no tubercles were seen on section of the lung.

Bronchial Glands.—Normal.

Heart.—Normal. The pericardial sac contained an excess of serous fluid.

The remaining lymphatic glands and organs were examined and found normal.

Microscopical Examination.

(Smears from)—

Liver.—Tubercle bacilli scanty.

Spleen.—Tubercle bacilli in moderate number.

Sternal Gland.—Tubercle bacilli scanty.

Lung { *(Caseous nodule).*—Tubercle bacilli numerous.
(Whitish focus).—Tubercle bacilli scanty.

VIRUS H. 80. "D.M."

TUBERCULOSIS OF THE LUNG.

VIRUS H. 80. "D.M." [Lung.]

JANUARY 22, 1907.

The emulsion of lung contained about 19,500,000 T.B. per cc.

CALF 1131.

Subcutaneous.

Dose : 195,000,000 T.B.

Killed : Jan. 23, 1908.

366 days.

P.M.—At the seat of inoculation there was an elastic fibroid tumour with a gritty cheesy caseous centre. In the left prescapular gland there was a nodular mass (2 cm.) similar on section. One small grey tubercle was seen in the lung.

GUINEA-PIGS.

—	Number.	Method.	Duration of Life.	Result.
E. of local lesion	2909	Intrap.	K. 191 days	Healthy.
E. of prescapular gland.	2911	Intrap.	K. 28 ,,	Early slight T.
	2912	Intrap.	K. 28 ,,	Early slight T.
	2913	Intrap.	K. 28 ,,	Early slight T.
E of bronchial gland.	2914	Intrap.	D. 1 day	? Cause of death.
	2915	Intrap.	D. 33 days	Slight early G.T.
E. of lung ...	2908	Intrap.	K. 49 ,,	Healthy.
E. of spleen ...	2910	Intrap.	K. 191 ,,	Healthy.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1096	Intrap.	19,500,000 T.B. each.	D. 4 days	No T. (psorospermosis).
1097	Intrap.		K. 114 ,,	Very slight G.T.
1098	Subcut.		K. 114 ,,	Local T., and slight T. of lungs.
1099	Subcut.		K. 114 ,,	Local T., and slight T. of lungs.

DOGS (PUPPIES).

Number.	Method.	Dose.	Duration of Life.	Result.
19	Intrap.	97,500,000 T.B. each.	K. 140 days	Peritoneum normal; nearly all the abdominal glands showed caseo-necrotic patches or scattered yellow foci. Fairly numerous non-progressive tubercles in lungs and liver, one in kidney.
21	Intrap.		K. 165 ,,	Fibro-caseous sub-peritoneal tumour. Omentum normal. Few tubercles on mesentery. Several small tubercles in each kidney; a group of three on the surface of liver. Moderately numerous small grey tubercles in lungs, the larger with caseous centres. Five tubercles in heart.

CALF 1141.

Subcutaneous.

Dose : 195,000,000 T.B.

Killed : April 25, 1907.

93 days.

P.M.—The local tumour was composed of dense fibrous tissue with a central cavity containing caseopus. The prescapular gland was almost entirely occupied by four masses of similar character. One cervical gland was caseo-calcareous. Two abdominal glands contained calcareous foci.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
2192	Subcut.	19,500,000 T.B. each.	D. 79 days	G.T.
2193	Intrap.		K. 121 ,,	Chronic G.T.

VIRUS H. 80. "D.M." [Lung]—*continued.*

CULTURE INOCULATIONS, APRIL 12, 1907.

The strain was derived from the original material, and had been in cultivation a total period of 81 days. The culture used was the 5th generation, 21 days old.

CALF 1209.

Subcutaneous.

Dose : 50·0 milligrammes.

Killed : Aug. 16, 1907.

126 days.

P.M.—Fibro-calcareous tumour at seat of inoculation. About half the left prescapular gland was occupied by two caseous gritty masses. In one left prepectoral gland was a small calcareous nodule. There was no tuberculosis elsewhere.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1255	Intrav.	1·0 mg.	D. 83 days	T. of lungs, bronchial glands, kidneys, and muscles.
1256	Intrav.	0·1 mg.	D. 249 „	Chronic G. T.
1257	Intrap.	10·0 mg.	D. 247 „	Chronic G. T.
1258	Subcut.	10·0 mg.	K. 725 „	A few calcareous foci in the glands near the seat of inoculation only (scapular glands). An emulsion of the lung produced severe G. T. in two guinea-pigs.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
2342	Intrap.	0·1 mg.	D. 43 days	G. T.
2343	Subcut.	0·1 mg.	D. 121 „	G. T.

CULTURE.

Derived from the lung of Rabbit 1258 through Guinea-pig 3690 (sternal gland). The 8th generation was used for inoculation on September 11, 1909, when 25 days old. Total duration of artificial cultivation, 124 days.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2450	Intrav.	0·1 mg.	K. 111 days	T. of lungs, kidneys, an eye, and a lachrymal gland (not severe).
2451	Intrav.	0·1 mg.	K. 111 „	Slight T. of lungs, and moderately severe T. of kidneys.
2452	Subcut.	10·0 mg.	K. 111 „	Local T. and slight T. of lungs.

CULTURE.

Derived from the scapular gland of Rabbit 1258 through Guinea-pig 3691 (sternal gland). The 3rd generation was used for inoculation on August 20, 1909, when 14 days old. Total duration of artificial cultivation, 105 days.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2416	Intrav.	0·01 mg.	K. 119 days	Slight T. of lungs and kidneys.
2417	Intrav.	0·01 mg.	K. 119 „	Very slight T. of lungs and kidneys.
2418	Subcut.	10·0 mg.	K. 119 „	Local T. and T. of lungs (not severe).

VIRUS H. 80. "D.M."—*continued.*

CALF PASSAGES

BEGINNING WITH A TISSUE EMULSION MADE FROM A TUBERCULOUS HUMAN LUNG.

[*Note that the chart of Passage β precedes that of Passage α.*]

PASSAGE β.

An emulsion made from the human lung was inoculated on January 22, 1907.

It was estimated to contain about 19,500,000 T.B. per cc.

CALF 1131.

Subcutaneous.

Dose: 195,000,000 T.B.

Killed: January 23, 1908. 366 days.

P.M.—At the seat of inoculation there was an elastic fibroid tumour with a gritty caseous centre. In the left precapular gland there was a nodular mass (2 cm.) similar on section. One small grey tubercle was seen in the lung. An emulsion of a bronchial gland produced tuberculosis in a guinea-pig.

Emulsion of prescapular gland into

GUINEA-PIGS 2911-2913.

Killed: 28 days. Early slight T.

Emulsion of various tissues into

GUINEA-PIGS 2966-2968.

Killed: 21 days. Early G. T.

March 12, 1908. Emulsion of G.P.'s tissues (T.B. very numerous).

CALF 1369.

Subcutaneous.

Dose: 10·0 cc. of emulsion.

Killed: August 5, 1908. 146 days.

P.M.—Fibro-calcareous patch at seat of inoculation; three calcareo-caseous tubercles in left prescapular gland; no tuberculosis elsewhere.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1758	Subcut.	2·5 cc.	K. 308 days	Local lesion and slight T. of lungs and kidneys.
1759	Subcut.	2·5 cc.	K. 308 "	

CULTURE.

Derived from the prescapular gland of Calf 1369. The 5th generation was used for inoculation when 6 days old, on October 9, 1908; the total duration of artificial cultivation was 65 days.

CALF 1475.

Subcutaneous.

Dose: 100·0 mg.

Killed when dying of urethral obstruction, October 31, 1908. 22 days.

P.M.—Local tuberculosis only.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2032	Subcut.	50·0 mg.	K. 160 days	Local lesion, slight T. of lungs and kidneys.
2033	Subcut.	10·0 mg.	K. 160 "	Local lesion; slight T. of lungs; one tubercle in a kidney.

VIRUS H. 80. "D.M."

CALF PASSAGES

BEGINNING WITH A TISSUE EMULSION MADE FROM A TUBERCULOUS HUMAN LUNG.

PASSAGE *a*.

An emulsion made from the human lung was inoculated on January 22, 1907.
It was estimated to contain about 19,500,000 T.B. per cc.

CALF 1141.

Subcutaneous.

Dose : 195,000,000 T.B.

Killed : April 25, 1907. 93 days.

P.M.—The tumour was composed of dense fibrous tissue with a central cavity containing caseo-pus. The prescapular gland was almost entirely occupied by four nodules of similar character. One cervical gland was caseo-calcareous. Two abdominal glands contained one or more calcareous foci.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1097	Intrap.	19,500,000 T.B. each.	K. 114 days	Very slight G.T.
1098	Subcut.		K. 114 „	Local T., and slight T. of lungs.
1099	Subcut.		K. 114 „	Local T., and slight T. of lungs.

Emulsion of left prescapular gland into :

CALF 1245.

Subcutaneous.

Estimated dose : 60,855,000 T.B.

Killed : July 19, 1907. 85 days.

P.M.—Small fibro-calcareo-caseous tumour at seat of inoculation. Few small calcareous lesions in left prescapular gland. No tuberculosis elsewhere.

GUINEA-PIGS 2931-2934.

(*For continuation of this branch of the passage experiment, see next chart.*)

Emulsion of prescapular gland into :

GUINEA-PIGS 2505-2507.

Killed : 28 days. Early G.T.

August 16, 1907. Emulsion of G.P.'s tissues (T.B. in moderate numbers).

CALF 1287.

Subcutaneous.

Dose : 20·0 cc. of emulsion.

Killed : February 4, 1908. 172 days.

P.M.—At the seat of inoculation there was a band of fibrous tissue at the lower end of which was a cyst with softened caseous contents. The left prescapular gland contained two calcareous patches and one prepectoral gland was caseo-calcareous. Two doubtful grey foci were seen in the lung. A few minute foci were seen in three thoracic and two abdominal glands.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1447	Subcut.	3·0 cc.	K. 213 days	Local lesion only.
1448	Subcut.	2·0 cc.	K. 213 „	Chronic G. T., ? partly spontaneous.

Emulsion of prescapular gland into :

GUINEA-PIGS 2922-2924.

Killed : 28 days. Early G.T.

March 3, 1908. Emulsion of G.P.'s tissues (T.B. fairly numerous).

CALF 1375.

Perivascular.

Dose : 10·0 cc. of emulsion.

Killed : August 6, 1908. 156 days.

P.M.—There was a fibro-calcareo-caseous tumour around the vein (which was normal). Two cervical glands were fibro-calcareo-caseous throughout and two others were affected, but less severely. A prescapular gland contained two calcareous tubercles. There were two tubercles in the small intestine and scattered small calcareous tubercles in the mesenteric and ileo-colic glands.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1755	Subcut.	5·0 cc.	K 155 days	Local T., severe T. of lungs, moderately severe T. of kidneys.
1756	Subcut.	5·0 cc.	D. 155 „	Local T., severe T. of lungs, slight T. of kidneys.

CULTURE.

Derived from the cervical gland of Calf 1375. Duration of artificial cultivation : 68 days. The 6th generation of culture was used when 4 days old, on October 13, 1908.

CALF 1495.

Subcutaneous.

Dose : 100·0 mg.

Killed : January 21, 1909. 100 days.

P.M.—There was a fibrous walled cyst containing caseo-necrotic masses and serous fluid, and the left prescapular gland contained three caseous slightly gritty nodules. There was no tuberculosis elsewhere.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2036	Subcut.	10·0 mg.	D. 106 days	Pseudo - tuberculosis.
2037	Subcut.	48·0 mg.	K. 106 „	Slight generalised tuberculosis.

PASSAGE *a*—(*completed*).

GUINEA-PIGS 2391-2394.

Intraperitoneal.

Inoculated with an emulsion of the left prescapular gland of Calf 1141 (*see preceding chart*).

Killed : 33 days. General tuberculosis.

May 28, 1908. Emulsion of G.P's. tissues (T.B. not very numerous).

DOG 41 (Puppy).

Intraperitoneal.

Dose : 10·0 cc. of emulsion.

Killed when apparently well : July 3, 1907.

36 days.

P.M.—Tuberculous peritonitis, not severe. Liver beset with minute grey tubercles. Lungs contained small tubercles very sparsely scattered ; there was one in the right kidney. Several abdominal glands were enlarged, but not definitely tuberculous.

Emulsion of various tissues (T.B. fairly numerous).

CALF 1265.

Intravenous.

Dose : 10·0 cc. of emulsion.

Died : Aug. 11, 1907.

39 days.

P.M.—General tuberculosis.

RABBIT.

Number.	Method.	Dose.	Duration of Life.	Result.
1371	Subcut.	1·0 cc.	K. 135 days	Local lesion and T. of lungs.

Emulsion of mediastinal gland (T.B. numerous).

CALF 1291.

Subcutaneous.

Dose : 20·0 cc. of emulsion.

Killed : October 2, 1907.

51 days.

P.M.—At the seat of inoculation there was a collapsed abscess. The adjacent glands were caseated almost throughout. In the lungs there were small tubercles very sparsely scattered and a few grey nodules with caseous foci. Small grey tubercles were fairly numerous in the liver, scanty in the kidneys and suprarenals. The portal, mesenteric and ileo-colic glands showed numerous firm patches, partly caseous. A few other glands showed one or two caseous foci, there were a few also in the Peyer's patches.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1441	Subcut.	4·0 cc.	D. 45 days	Local T., and one tubercle in lung. ? cause of death.
1442	Subcut.	4·0 cc.	K. 175 „	Local lesion and slight T. of lungs and one kidney.

Emulsion of prescapular gland (T.B. not numerous.)

CALF 1281.

Intravenous.

Dose : About 18·0 cc. of emulsion.

Killed : July 23, 1908.

295 days.

P.M.—Around the vein there was some thickening composed of caseopus in a thin fibrous wall. The thoracic glands contained each a few calcareous foci. There was a calcareous focus in the liver and some doubtful foci in the lung.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1524	Subcut.	2–3·0 cc.	K. 218 days	Local lesion and rather severe T. of lungs.
1525	Subcut.	2–3·0 cc.	K. 218 „	Local lesion and slight T. of lungs.

CULTURE.

Derived from the mediastinal gland of Calf 1281. The 5th generation of culture was used for inoculation when 14 days old, on October 5, 1908 ; the total duration of artificial cultivation was 74 days.

CALF 1485.

Subcutaneous.

Dose : 60·0 mg.

Killed : January 15, 1909.

102 days.

P.M.—The local tumour consisted of thickened skin and fibroid tissue, and the left prescapular gland showed about half its substance replaced by caseous gritty tissue. There was no tuberculosis elsewhere.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2023	Subcut.	10·0 mg.	K. 149 days	Local lesion, slight T. of lungs, one tubercle in each kidney.
2024	Subcut.	10·0 mg.	K. 149 „	Local T. and retrogressive T. of lungs.

Emulsion of lung (T.B. numerous).

CALF 1279.

Subcutaneous.

Dose : 20·0 cc. of emulsion.

Killed : March 28, 1908.

229 days.

P.M. — There was a patch of thickened skin showing a linear scar at the seat of inoculation, and beneath it a small caseous nodule. The left prescapular gland contained some small scattered nodules, a few caseous the rest calcareous. There was no tuberculosis elsewhere.

Emulsion of prescapular gland into :

GUINEA-PIG 3014.

Died : 21 days. Early G. T.

CULTURE.

Derived from the sternal gland of G.P. 3014. The second generation was used for inoculation, when 16 days old, on May 21, 1908 ; the total duration of artificial cultivation was 33 days.

CALF 1455.

Subcutaneous.

Dose : 47·0 mg.

Killed : September 12, 1908.

114 days.

P.M.—Small fibrous-walled cyst with caseo-purulent contents at seat of inoculation. The left prepectoral gland was two-thirds fibro-caseo-calcareous. On the diaphragm there was a loosely-attached fibro-calcareous nodule. No tuberculosis elsewhere.

CULTURE.

Derived from the prescapular gland of Calf 1279. The 6th generation was used for inoculation when 21 days old, on July 31, 1908 ; the total duration of artificial cultivation was 125 days.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1955	Subcut.	One serum culture.	K. 164 days	Local lesion and one tubercle in a kidney.
1956	Subcut.	Do.	K. 164 „	Local lesion and slight T. of lungs

DOG 39 (Puppy).

Intraperitoneal.

Dose : 10·0 cc. of emulsion.

Killed when apparently well : July 2, 1907.

35 days.

P. M. — Tuberculous peritonitis, moderately severe. Numerous grey tubercles in liver, few in kidneys ; the spleen was peppered with minute grey points. Sparsely scattered tubercles with caseous centres in lungs. Early caseation of several abdominal and the sternal glands.

Emulsion of various tissues (T.B. numerous).

CALF 1255.

Subcutaneous.

Dose : 20·0 cc. of emulsion.

Killed : December 3, 1907.

154 days.

P.M.—Small cyst with very thick fibrous walls at seat of inoculation. The left prescapular gland contained only two small tubercles. A miliary tubercle was seen in one suprarenal.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1366	Subcut.	1·0 cc.	K. 149 days	Local lesion and slight T. of lungs.
1367	Subcut.	1·0 cc.	D. 125 „	Local lesion and a few tubercles in the lungs. Death from other causes.

CALF 1141. Virus H. 80. "D.M."

Subcutaneous inoculation of an emulsion made from the human lung.

Dose—195,000,000 T.B. [Vol. 10·0 cc. E = 19,500,000 T.B. per cc.].

Date of Inoculation—January 22, 1907. [Age about 5 months.]

Killed when in good health—April 25, 1907. [93 days after inoculation.]

Clinical Notes.

A large subcutaneous tumour apparently involving the subjacent muscles developed at the seat of inoculation; on February 14 it measured 10 by 9 cm. The prescapular gland became considerably enlarged, measuring on the same date 10 cm. in long diameter. The tumour subsequently became soft and fluctuating. The calf remained in good health during the experiment.

Temperature.—The temperature reaction was of the type usually seen after injection of viruses of Group II. The temperature rose to 39·5° C. on the 16th day, reached a maximum (40·5° C.) on the 18th day, and slowly fell to normal. From the 31st day onwards the temperature remained normal.

Tuberculin Test.—The calf was not tested subsequent to inoculation.

Weights.—The weight at inoculation was not recorded. The weight at death was 2 cwt. 2 qrs. 14 lbs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—The tumour at the seat of inoculation measured 8 by 8 by 5 cm. and was composed of dense fibrous tissue containing a cavity 4 by 4 by 3 cm. filled with tenacious caseo-pus; the cavity communicated externally through a small opening at the bottom of a shallow depression in the skin and was lined internally by smooth granulation tissue; the fibrous tissue surrounding the cavity contained some isolated caseo-calcareous nodules and foci.

Left Prescapular Gland.—The left prescapular gland measured 8 by 5 by 2·5 cm. and on section showed the greater part of its substance replaced by four tuberculous masses composed around the margins of translucent fibroid tissue and in the centre of soft caseo-pus; the fibroid tissue was beset with caseo-calcareous streaks and foci.

Right Prescapular Gland.—Measured 5 by 2·5 by 1·3 cm., and was normal on section.

Cervical Glands.—One of the lower cervical glands on the left side was much enlarged (2·5 cm. in greatest diameter) and on section was composed of friable caseo-calcareous substance and a white fibrous capsule 5 mm. in greatest thickness. Other cervical glands were normal.

Prepectoral and Axillary Glands.—Normal.

Thorax.

Pleura, Lungs, Thoracic Glands, Heart.—Normal.

Abdomen.

Peritoneum, Omentum, Liver, Portal Glands, Spleen, Kidneys, Suprarenal Bodies, Renal, Lumbar, and Iliac Glands.—Normal.

Alimentary Tract.

Tongue, Pharynx, Palate, Tonsils.—Normal.

Submaxillary, Parotideal, Retropharyngeal and Hyoid Glands.—Normal.

Intestines.—Normal.

Mesenteric Glands.—One showed in the cortex a calcareous focus; the rest were normal.

Ileo-colic Glands.—One contained three or four irregular yellow calcareous foci.

Colic Glands.—Normal.

Various Lymphatic Glands.

Precrural, Popliteal, Gluteal, Ischiatic, Pudic.—Normal.

Testes.—Normal.

Microscopical Examination.

Emulsion of Prescapular Gland.—Tubercle bacilli.

Focus from Ileo-colic Gland.—Tubercle bacilli, scanty.

Animals Inoculated.

Calf 1245 was inoculated with an emulsion made from the left prescapular gland.

Guinea-pigs 2391–2394 were inoculated intraperitoneally with the same emulsion. All became tuberculous.

CALF 1131. Virus H. 80. "D.M."

Subcutaneous inoculation of an emulsion made from the human lung.

Dose—195,000,000 tubercle bacilli. [Vol. 10·0 cc. E=19,500,000 T.B. per cc.]

Date of Inoculation—January 22, 1907. [Age about 5 months.]

Killed when in good health—January 23, 1908. [366 days after inoculation.]

Clinical Notes.

A swelling of moderate size developed at the seat of inoculation and the left prescapular gland became enlarged. The tumour was rather deeply situated and never became adherent to the skin; the injection had apparently been made under the fascia covering the muscles.

The animal remained in good health and grew well during the experiment, and when killed was a fine bull, weighing 6 cwt. 3 qrs. 17 lbs.

Temperature.

There was a period of slight pyrexia commencing on the 14th day after inoculation and lasting 17 days, the maximum temperature being 40·5° C. Subsequently the temperature was normal.

Tuberculin Test.

June 10, 1907. [139 days after inoculation.] Reacted. Rise of temperature, 1·8° C.

POST-MORTEM EXAMINATION.

The carcass was fat.

Local Lesion.—At the seat of inoculation on the left side of the neck there was an elastic tumour the size of a goose's egg, adherent to the aponeurosis of the superficial muscles; the skin over it was freely moveable; on section it had a thick white fibrous margin, at one part 2 cm. broad, and a cheesy gritty caseous centre.

Left Prescapular Gland.—The left prescapular gland was very slightly larger than the right; near the hilum in the cortex there was a nodular mass 2 cm. in greatest diameter; this was composed of cheesy gritty caseous substance surrounded by a moderately thick wall of fibrous tissue. The rest of the gland substance was normal, with the exception that the interstitial tissue appeared to be increased in amount.

Right Prescapular Gland.—The right prescapular gland measured 6·5 by 3 by 1·5 cm. and was normal on section.

Prepectoral and Axillary Glands.—Normal.

Thorax.

Pleura, Thoracic Glands, Heart.—Normal.

Lungs.—The lungs were perfectly normal in general appearance; just under the pleura of the left cephalic lobe a pinhead-sized grey tubercle was seen; no tubercles were seen elsewhere.

Abdomen.

Omentum and Peritoneum, Liver, Spleen, Kidneys.—Normal.

Suprarenal Bodies.—In the cortex of each there were a few small pale areas; there were no definite tubercles.

Renal, Lumbar, Iliac, Portal Glands.—Normal.

Alimentary Tract.

Tongue, Pharynx, Palate, Tonsils; Retro-Pharyngeal, Submaxillary, and Parotideal Glands; Intestines and Mesenteric Glands.—Normal.

Testicles.—Normal.

Various Lymphatic Glands.

Precrural, Popliteal, Gluteal, Ischiatic, Pudic.—Normal.

Microscopical Examination.

Emulsion of Left Prescapular Gland.—Tubercle bacilli moderately numerous.

Emulsion of the Local Lesion.—Tubercle bacilli moderately numerous.

Tubercle (?) from Suprarenal Body.—No tubercle bacilli. A few bacilli stained blue were seen.

Animals Inoculated.

Guinea-pigs were inoculated intraperitoneally with emulsions of various tissues; No. 2909 with an emulsion of the local lesion; Nos. 2911–2912–2913 with an emulsion made from the prescapular gland; Nos. 2914–2915 with an emulsion of the left bronchial gland; No. 2908 with an emulsion of the lung, and No. 2910 with an emulsion of the spleen. The guinea-pigs inoculated with the local lesion, the lung and the spleen remained healthy, those inoculated with the prescapular and bronchial glands became tuberculous.

CALF 1209. Virus H. 80. "D.M."

Subcutaneous inoculation of culture derived from the human lung, direct.

Dose—50·0 milligrammes.

Date of Inoculation—April 12, 1907. [Age 9½ weeks.]

Killed when in good health—August 16, 1907. [126 days after inoculation.]

Clinical Notes.

A tumour of moderate size developed at the seat of inoculation on the left side of the neck. A month after inoculation it measured 13 by 7 cm., and after two months 11 by 7 cm. It was at first firm, but afterwards became soft and fluctuating; 9½ weeks after inoculation an opening appeared in the overlying skin, through which caseo-purulent material exuded. The tumour subsequently diminished considerably in size.

The left prescapular gland became moderately enlarged; four weeks after inoculation it measured 8 cm. in length; after 8 weeks it measured 6 cm.

The calf remained in good health during the experiment.

Temperature.—There was a slight rise of temperature commencing on the 10th day after inoculation, reaching a maximum of 40·2° C., and lasting 10 days. During the remaining period of the experiment the temperature remained normal.

Tuberculin Test.—June 10, 1907. [59 days after inoculation.] Reacted. Rise of temperature, 1·5° C.

Weights.—The calf was not weighed on the day of inoculation; on the day it was killed it weighed 2 cwt. 0 qrs. 15 lbs.

POST-MORTEM EXAMINATION.

Carcass.—In good condition.

Local Lesion.—At the seat of inoculation on the left side of the neck there was a firm tumour measuring 8 by 5 by 2·5 cm. and showing on the surface a depressed scar; on section the tumour was lenticular in outline (plano-convex) and composed of thickened skin and fibrous tissue beset with calcareous nodules and foci.

Left Prescapular Gland.—The left prescapular gland measured 6 by 3·5 by 2 cm. and showed on section two dense caseous masses, gritty chiefly around the margins, 3 and 1·5 cm. in greatest diameter respectively; one of the masses was semilunar in outline, and partly encircled a mass of fibrous tissue which extended in from the capsule.

Right Prescapular Gland.—Measured 5·5 by 2·5 by a little over 1 cm. Normal on section.

Prepectoral Glands.—One contained a small pea-sized calcareous nodule; the rest were normal.

Axillary Glands.—Normal.

Thorax.

Pleura, Lungs, Thoracic Glands, and Heart.—Normal.

Abdomen.

Omentum and Peritoneum; Spleen, Liver, and Portal Glands; Kidneys and Suprarenal Bodies; Coeliac, Renal, Lumbar, and Iliac Glands.—Normal.

Alimentary Tract.

Tongue, Pharynx, Palate, Tonsils; Retropharyngeal, Hyoid, Submaxillary, and Parotideal Glands; Intestines and Mesenteric Glands.—Normal.

Mamma.—Normal.

Supramammary Glands.—Normal.

Eyes.—Normal.

Various Lymphatic Glands.

Precrural, Popliteal Gluteal and Ischiatic.—Normal.

CALF 1245. Virus H. 80. "D.M."

Subcutaneous inoculation of an emulsion made from the left prescapular gland of Calf 1141.

Dose—60,855,000 tubercle bacilli. [Vol. 10·0 cc. E = 6,085,500 T.B. per cc.]

Date of Inoculation—April 25, 1907. [Age about 9 weeks.]

Killed when in good health—July 19, 1907. [85 days after inoculation.]

Clinical Notes.

A small tumour developed at the seat of inoculation on the left side of the neck and the adjacent prescapular gland became slightly enlarged. The calf remained in good health during the experiment.

Temperature.—Approximately normal throughout.

Tuberculin Test.—June 10, 1907. [46 days after inoculation.] Reacted. Rise of temperature, 1·8° C.

Weight (at death).—1 cwt. 2 qrs. 13 lb.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—At the seat of inoculation on the left side of the neck there was a firm somewhat irregular tumour, measuring 6 by 5 by 1 cm., composed of fibrous tissue closely beset with calcareo-caseous nodules; there were also a few softened caseous nodules.

Left Prescapular Gland.—The left prescapular gland was about half as large again as the right, and showed on section two small calcareous patches and a few calcareous grains.

Right Prescapular Gland.—The right prescapular gland measured 5·5 by 2 by 1·2 cm. and was normal on section.

Prepectoral and Axillary Glands.—Normal.

Thorax.

Pleura, Lungs, Thoracic Glands, Heart.—Normal.

Abdomen.

Omentum and Peritoneum, Spleen, Liver and Portal Glands, Kidneys and Suprarenal Bodies, Renal, Lumbar, and Iliac Glands.—Normal.

Alimentary Tract.

Tongue, Pharynx, Palate and Tonsils; Submaxillary, Hyoid, Parotideal, and Retropharyngeal Glands; Intestines and Mesenteric Glands.—Normal.

Testicles.—Normal.

Various Lymphatic Glands.

Precrural, Popliteal, Gluteal, Ischiatic, Pudic.—Normal.

Microscopical Examination.

Emulsion of Prescapular Gland.—Tubercle bacilli scanty.

Animals Inoculated.

Three guinea-pigs, Nos. 2505–2507, were inoculated intraperitoneally with an emulsion made from the left prescapular gland. All became tuberculous.

CALF 1287. Virus H. 80. "D.M."

Subcutaneous inoculation of an emulsion made from the omentum, the spleen, the portal, coeliac and sternal glands of each of three guinea-pigs, Nos. 2505-2507, inoculated with the prescapular gland of Calf 1245.

Dose—20·0 cc. of emulsion. T.B. moderately numerous.

Date of Inoculation—August 16th, 1907. [Age about 7 weeks.]

Killed when in good health—February 4, 1908. [172 days after inoculation.]

Clinical Notes.

Six days after the inoculation on the left side of the neck there was a slight thickening at the seat of inoculation, and the left prescapular gland was slightly enlarged.

Five weeks after the inoculation there was a very elongated firm local tumour about 20 cm. in length. The prescapular gland was the size of a goose's egg; the left prepectoral gland that of a Brazil nut.

The tumour subsequently became less firm, and both it and the adjacent glands diminished in size.

The calf remained well during the experiment.

Temperature.

For nearly five weeks following the inoculation the temperature was raised and irregular, the maximum temperature recorded during this period being 40·2° C. (on the 21st and 28th days), and the minimum 38·6° C. (on the 5th day).

At the close of the 5th week after inoculation, the temperature fell sharply to the normal, and remained approximately normal during the remaining period of the experiment.

Tuberculin Test.

The calf was not tested subsequent to inoculation.

Weight.

At death—2 cwt. 1 qr. 23 lb.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—In the subcutaneous tissues on the left side of the neck there was a band of fibrous tissue about 18 cm. in length and 4 cm. in greatest breadth; at the upper extremity there were three or four softened caseous nodules up to 1 cm. in diameter, and at the lower a cyst the size of a hen's egg, with very thick fibrous walls and yellow caseous pultaceous contents; elsewhere the band contained discrete calcareo-caseous tubercles and calcareous grains.

Left Prescapular Gland.—The left prescapular gland was slightly larger than the right; at one extremity of the gland the cortex was replaced by a patch 2 cm. in greatest diameter of calcareous substance, the capsule over which was thickened ; in the cortex, about the middle of the convex surface, there was a calcareous nodule a little less than 1 cm. in diameter.

Right Prescapular Gland measured 4·5 by 2·5 by 1·5 cm. and was normal on section.

Prepectoral Glands.—On the left side, one the size of a large pea was composed of softened caseo-calcareous substance, intersected by fibrous trabeculae.

Cervical Glands.—One in the middle of the neck on the left side contained a miliary calcareo-caseous tubercle. The others were normal.

Thorax.

Lungs.—Two doubtful grey foci, each about 0·5 mm. in diameter, were seen under the pleura ; otherwise the lungs were perfectly normal.

Thoracic Glands.—The long mediastinal gland was normal, but the other dorsal mediastinal glands and the bronchial glands contained sparsely scattered minute yellow calcareous tubercles.

Pleura, Heart, Larynx and Trachea.—Normal.

Abdomen.

Omentum and Peritoneum, Spleen, Liver, Kidneys and Suprarenal Bodies.—Normal.

Coeliac Glands.—One contained a pinhead-sized calcareous tubercle.

Portal Glands.—In one there was a minute calcareous grain ; the rest were normal.

Renal, Lumbar and Iliac Glands.—Normal.

Alimentary Tract.

Tongue, Pharynx, Palate, Tonsils, Retro-pharyngeal, Submaxillary and Parotideal Glands, Intestines and Mesenteric Glands.—Normal.

Peripheral Lymphatic Glands.—All were normal.

Microscopical Examination.

Emulsion of Prescapular Gland.—One tubercle bacillus seen.

Animals Inoculated.

Three guinea-pigs, Nos. 2922, 2923 and 2924, were inoculated intraperitoneally with an emulsion made from the left prescapular gland. They were killed after 28 days, and showed early general tuberculosis.

One guinea-pig, No. 2925, was inoculated intraperitoneally with an emulsion made from the left bronchial gland. It died in one day ; the cause of death was not apparent.

CALF 1375. Virus H. 80. "D.M."

Perivascular inoculation of an emulsion made from various tissues of Guinea-pigs 2922, 2923, and 2924, infected from the prescapular gland of Calf 1287.

Dose—10·0 cc. of emulsion which contained fairly numerous tubercle bacilli.

Date of Inoculation—March 3, 1908. [Age about 15 weeks.]

Killed when in good health—August 6, 1908. [156 days after inoculation.]

Clinical Notes.

The calf remained well during the experiment.

Temperature.

There was a slight rise of temperature lasting eleven days (maximum 40·1° C.) shortly after inoculation ; with this exception the temperature was normal during the experiment.

Weight.

At death—1 cwt. 3 qrs. 12 lbs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—On the left side of the neck in the loose tissues about the jugular vein there was an elongated irregular mass 8 cm. in length and 2 cm. in greatest thickness ; on section it was composed of dense fibro-calcareo-caseous tissue ; the jugular vein was normal and not adherent to the tumour.

Cervical Glands.—One at the level of the larynx, the size of a broad bean, and one near the lesion, the size of a pea, were dense and fibro-calcareo-caseous throughout ; another small gland near the latter was partly calcareo-caseous.

One of the lower cervical glands on the right side contained a few calcareous tubercles.

Prescapular Glands.—The left prescapular gland measured 5·2 by 2·5 by 1 cm. and showed in the cortex two calcareous tubercles each the size of a millet seed.

The right prescapular gland measured 5·5 by 2·8 by 1·2 cm. and was normal on section.

Prepectoral Glands.—Normal.

Thorax.

Pleura, Lungs, Heart, Thoracic Glands.—Normal.

Abdomen.

Omentum and Peritoneum ; Spleen, Liver, Portal Glands, Kidneys and Suprarenal Bodies ; Renal, Lumbar and Iliac Glands.—Normal.

Alimentary Tract.

Tongue, Pharynx, Tonsils ; Submaxillary, Retropharyngeal, and Parotideal Glands.—Normal.

Intestines.—A Peyer's patch about the middle of the small intestine contained a soft yellow focus and a calcareous focus. The large intestine was normal.

Mesenteric Glands.—The majority of the mesenteric glands contained sparsely scattered calcareous tubercles ranging from a mere point to about 1 mm. in diameter.

Ileo-Colic Glands.—There were similar scattered tubercles in the ileo-colic glands.

Testicles.—Normal.

Various Lymphatic Glands.

Precrural, Popliteal, Axillary, Gluteal, Ischiatic, Pudic.—Normal.

Microscopical Examination.

Smear from the Local Lesion.—Tubercle bacilli numerous.

Smear from a Cervical Gland.—Tubercle bacilli numerous.

Animals Inoculated.

Guinea-pigs 3205 and 3206 were inoculated intraperitoneally with an emulsion of the bronchial and mediastinal glands. They were killed 39 days later and found healthy.

CALF 1495. Virus H. 80. "D.M."

Subcutaneous inoculation of culture derived from the cervical gland of Calf 1375.

Dose—100·0 milligrammes.

Date of Inoculation—October 13, 1908. [Age about 17 weeks.]

Killed when in good health—January 21, 1909. [100 days after inoculation.]

Clinical Notes.

A prominent fluctuating tumour of moderate size developed at the seat of inoculation and the left prescapular gland became enlarged and hard. The calf remained well during the experiment.

Temperature.

During the first four weeks after the inoculation the temperature was raised and irregular, averaging about 39·6° C. (maximum 40·6° C., minimum 38·8° C.). Subsequently the temperature was a little irregular, but showed no marked deviation from the normal.

Tuberculin Test.

January 7, 1909. [86 days after inoculation.] Dose, 2·0 cc. Slight reaction. Rise of temperature, 0·9° C.

Weights.

	cwt.	qrs.	lbs.
October 13, 1908	1	2	9
January 21, 1909	2	0	12

Total gain of weight.—2 qrs. 3 lbs.

Average rate of gain per week.—4·1 lbs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—At the seat of inoculation on the left side of the neck there was a fluctuating swelling measuring 12 by 8·5 by 6 cm.; on section it was a cyst filled with soft caseo-necrotic masses and yellow serous fluid; the wall was of thick fibrous tissue lined internally with granulation tissue, and the cavity was crossed by fibrous trabeculæ. The skin over the cyst was much thickened.

Left Prescapular Gland.—The left prescapular gland measured 7 by 3 by 1·8 cm., and contained three dense irregular caseous nodules slightly gritty from calcification varying from 1 to 2 cm. in greatest diameter.

The Right Prescapular Gland measured 5 by 1·8 by 1 cm., and was normal on section.

There was no sign of tuberculosis elsewhere in the body.

Microscopical Examination.

Emulsion of Prescapular Gland.—A few tubercle bacilli.

CALF 1265. Virus H. 80. "D.M."

Intravenous inoculation of an emulsion made from the omentum, spleen, and several abdomin glands of Dog 41.

Dose—10·0 cc. of emulsion containing fairly numerous tubercle bacilli.

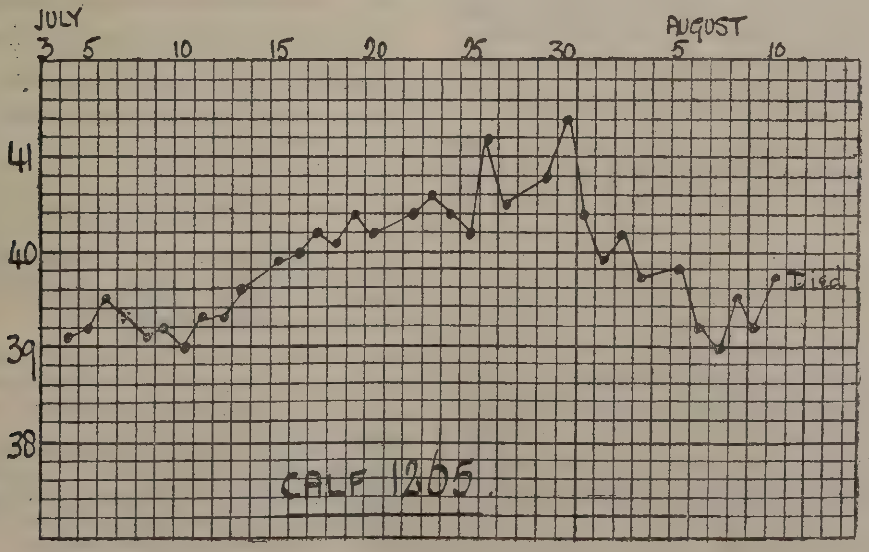
Date of Inoculation—July 3, 1907. [Age about eight weeks.]

Died—August 11, 1907. [39 days after inoculation.]

Clinical Notes.

The course of the disease was similar to that usually seen in cases of acute tuberculosis produced by intravenous inoculation—high temperature, emaciation and increasing difficulty of respiration culminating death.

Temperature.



Tuberculin Test.

The calf was not tested subsequent to inoculation.

POST-MORTEM EXAMINATION.

Carcass emaciated.

Local Lesion.—There was some well marked thickening along two veins in the left ear ; on section the thickenings were caseous and softened.

Parotideal Glands.—The left was deeply congested and showed in the cortex a firm grey patch beset with yellow caseous foci.
The right was deeply congested, but there was no definite tuberculosis.

Submaxillary Glands.—The left showed in the cortex a dense yellow caseous nodular mass 1 cm. in greatest diameter.
The right was enlarged and contained two caseopurulent masses the largest the size of a thrush's egg.

In the right cheek there was a small abscess which was unconnected with the teeth.

Thorax.

There was a slight excess of fluid in the pleural cavities.

Lungs.—The lungs were heavy and weighed 6 lbs. 10 ozs. The left lung was firm dark red and quite airless, sinking in water ; on section the parenchyma had a greyish mottled or speckled appearance, which with a hand lens was seen to be due to minute grey points rather indefinite in outline, and small irregular greyish patches formed apparently by aggregated foci ; occasionally a more opaque point was seen.
The right middle lobe was solid and resembled the left lobes except towards the ventral tip which had a more homogeneous greyish appearance than the rest of the lobe.
The right cephalic and right caudal lobes were congested and crepitant except for some lobules here and there which were dark red and consolidated ; the crepitant lung tissue was infiltrated with translucent grey foci, indefinite in outline, similar to those in the left lung.
The bronchi in the solid lobes contained mucopus.

Heart.—The pericardium, parietal and visceral, was deeply injected. The endocardium of the right auricle and right ventricle presented fairly numerous minute grey points ; on the endocardium of the left ventricle a few grey points were seen.

Thoracic Glands.—The dorsal mediastinal and bronchial glands were two to three times the normal in size ; the cortices had a greyish infiltrated appearance, showing sometimes greyish patches or foci, sometimes a greyish network ; the substance of the glands was soft, especially the congested medullary parts, and readily broke down when squeezed with the fingers or scraped with a knife.
The ventral mediastinal glands were normal.

Pleura.—The lymphatic fringes here and there along the margins of the ribs were congested, and there was general injection of the vessels under the costal pleura.

Abdomen.

Omentum and Peritoneum.—Normal.

Spleen.—The spleen was not apparently enlarged ; the pulp was soft and dark red ; no tubercles were seen.

Liver.—The substance of the liver was paler than normal, and with a hand lens numerous minute grey points could just be seen.

Portal Glands.—Normal.

Kidneys.—The cortices of the kidneys were pale ; no tubercles were seen in them.

Suprarenal Bodies.—Normal.

Lumbar and Iliac Glands.—Normal.

Renal Gland.—The renal gland was much enlarged, very soft, and engorged with blood ; no tubercles were seen.

Alimentary Tract.

The pharyngeal, laryngeal and tracheal mucous membrane was injected.

Tonsils.—The tonsils were congested, otherwise normal.

Intestines.—The whole mucous surface of the small intestine was speckled with minute grey foci which were apparently situated just beneath the mucous membrane.
Similar foci were seen under the mucous membrane of the large intestine.

Mesenteric Glands.—The mesenteric glands were not enlarged, and showed no definite tubercles.

Testicles.—Normal.

Eyes.—Normal.

Various Lymphatic Glands. — The prescapular, axillary, prepectoral, popliteal, gluteal, ischiatic and retropharyngeal glands were slightly enlarged, oedematous and deeply congested ; no tubercles were seen in them. The cervical and precrural glands were normal.

Microscopical Examination.

Lung, Emulsion of.—Tubercle bacilli numerous.

Mediastinal Gland, Emulsion of.—Tubercle bacilli numerous.

Spleen, Smear from.—Tubercle bacilli in moderate numbers.

Liver, Smear from.—Tubercle bacilli numerous.

Intestine, Scraping from Peyer's Patch.—Tubercle bacilli fairly numerous.

Kidney, Smear from.—Tubercle bacilli in moderate numbers.

Left Submaxillary Gland.—A few tubercle bacilli in amorphous granular material.

Right Submaxillary Gland.—A few tubercle bacilli.

Prescapular Gland.—Tubercle bacilli numerous.

Popliteal Gland.—A few tubercle bacilli.

Marrow (tibia).—A few tubercle bacilli.

Animals Inoculated.

Calf 1279 was inoculated subcutaneously with 20·0 cc. of an emulsion made from the lung, and Calf 1291 subcutaneously with 20·0 cc. of an emulsion made from the mediastinal gland.

Two rabbits, 1439 and 1440, were inoculated each subcutaneously with 4·0 cc. of the former emulsion, and two, 1441 and 1442, subcutaneously with 4·0 cc of the latter emulsion.
No. 1439 and 1440 died prematurely in 10 and 17 days and showed no tuberculous lesions ; No. 1441 died prematurely in 45 days and showed slight tuberculosis ; No. 1442 was killed after 175 days and showed slight generalized tuberculosis.

CALF 1255. Virus H. 80. "D.M."

Subcutaneous inoculation of an emulsion made from the omentum, the spleen, and the sternal, portal and coeliac glands of Dog 39.

Dose—20·0 cc. The emulsion contained numerous tubercle bacilli.

Date of Inoculation—July 2, 1907. [Age about 8 weeks.]

Killed when in good health—December 3, 1907. [154 days after inoculation.]

Clinical Notes.

A very large soft fluctuating tumour developed at the seat of inoculation on the left side of the neck; at the time the animal was killed this had diminished considerably in size. The left prescapular gland became moderately enlarged—about 7 cm. in length on August 28; subsequently it diminished in size.

The calf remained in good health during the experiment.

Temperature.

On the 9th day after inoculation the temperature rose to 39·9° C., and remained high for 15 days. The maximum was 40·0° C. on the 16th day.

Subsequently the temperature was normal.

Tuberculin Test.

The calf was not tested subsequent to inoculation.

Weights.

The weight was not recorded at the time of inoculation. When killed the calf was a big strong animal and weighed 2 cwt. 1 qr. 23 lbs.

POST-MORTEM EXAMINATION.

The carcass was fat.

Local Lesion.—In the subcutaneous tissues on the left side of the neck there was a cystic tumour the size of a hen's egg with very thick fibrous walls and yellow caseo-purulent contents suspended in a small quantity of clear watery fluid.

The skin over the cyst was greatly thickened.

Left Prescapular Gland.—The left prescapular gland measured about 6 by 3·5 by 1·3 cm.; on section the tissues of the gland was tougher than normal, showing an increase in the interstitial connective tissue; the gland was cut up into thin slices, and only two soft yellow tubercles, the largest about 1 mm. in diameter, were found in the cortex. The capsule of the gland was distinctly thickened in places.

Right Prescapular Gland.—Measured 5·5 by 2·5 by 1 cm. and was normal on section.

Prepectoral and Axillary Glands.—Normal.

Suprarenal Bodies.—The left suprarenal body showed in the cortex an opaque yellowish-white miliary tubercle.

There was no sign of tuberculosis elsewhere in the body.

Microscopical Examination.

Emulsion of Left Prescapular Gland.—A few tubercle bacilli.

Emulsion of a Bronchial Gland.—No tubercle bacilli.

Tubercle from Suprarenal Body.—Tubercle bacilli in moderate numbers.

Animals Inoculated.

Guinea-pigs 2823 and 2824 were inoculated intraperitoneally (the latter also partly subcutaneously) with an emulsion made from the left prescapular gland; they were killed 71 days later and showed general tuberculosis.

Guinea-pigs 2825 and 2826 were inoculated intraperitoneally with an emulsion made from the left bronchial gland. They were killed 71 days later and found healthy.

CALF 1291. Virus H. 80. "D.M."

Subcutaneous inoculation of an emulsion of the long mediastinal gland from Calf 1265.

Dose—20·0 cc. of the emulsion, containing numerous tubercle bacilli.

Date of Inoculation—August 12, 1907. [Age about 7 weeks.]

Killed when in good health—October 2, 1907. [51 days after inoculation.]

Clinical Notes.

Ten days after the inoculation on the left side of the neck there was an elongated flat local thickening measuring 13 by 6 cm. The left prescapular gland was slightly enlarged, measuring 6 cm. in length. The local thickening developed into an elongated fluctuating tumour, which on the 21st day opened and discharged caseo-purulent contents.

On the 42nd day the tumour was elongated and fluctuating, with a small opening towards the lower extremity covered with dried caseo-pus. The prescapular gland was moderately enlarged, 9· cm. in length.

On the 51st day the calf was killed. It had remained in good health during the experiment.

Temperature.

During the first four weeks after inoculation the temperature was irregular and somewhat raised, the range of variation being from 38·5 to 40·3° C. During the following three weeks the temperature was normal.

Tuberculin Test.

The calf was not tested subsequent to inoculation

Weight.

At death.—1 cwt. 1 qr. 16 lbs.

POST-MORTEM EXAMINATION.

Carcass in good condition.

Local Lesion.—In the subcutaneous tissues on the left side of the neck there was a collapsed abscess, about the size of a hen's egg, with caseo-purulent contents and thick pinkish fibrous walls beset with caseous streaks and foci; the cavity communicated with the exterior through a short wide sinus which led from the lower extremity of the cyst. The skin over the cyst was much thickened.

Left Prescapular Gland.—The left prescapular gland measured 7·5 by 5 by 3 cm., and was composed almost throughout of dense pinkish-yellow caseated tissue containing scattered minute foci of calcification; the capsule in places was much thickened.

Right Prescapular Gland.—The right prescapular gland measured 5 by 2 by 1 cm., and was normal.

Prepectoral Glands.—On the left side there were two enlarged glands, the largest 1 cm. in diameter, composed practically throughout of dense yellow caseated tissue.

Other prepectoral glands were normal.

Cervical and Axillary Glands.—Normal.

Thorax.

Pleura and Heart.—Normal.

Lungs.—The lungs were normal in general appearance. On close inspection very sparsely scattered tubercles were seen, varying in size from a small speck up to that of a millet seed; the smaller ones were grey, the larger had caseous centres. There were besides three or four grey nodules, the largest 3 mm. in diameter, containing caseous points.

Thoracic Glands.—The bronchial and dorsal mediastinal glands were normal in size; the larger ones showed in the cortex a few soft yellow foci, the smaller ones appeared normal.

The ventral mediastinal glands were normal.

Abdomen.

Omentum and Peritoneum.—Normal.

Spleen.—The spleen was normal in size; the Malpighian bodies were conspicuous, but there were no tubercles.

Liver.—The liver substance contained fairly numerous evenly distributed greyish-white translucent tubercles ranging in size from a mere point up to about 1 mm. or more in diameter.

Portal Glands.—The portal glands were normal in size; in the cortex of one there were some rather firm patches containing caseous foci and an irregular caseous network; in the others there were a few scattered greyish points.

Kidneys.—There were some old scars in the cortex of each kidney; in that of the right two small grey tubercles were seen; there was a doubtful grey point in the cortex of the left; the capsules stripped badly.

Suprarenal Bodies.—The left suprarenal body showed in the cortex three or four grey tubercles; there were two minute tubercles in the cortex of the right.

Renal, Lumbar and Iliac Glands.—Normal.

Alimentary Tract.

Tongue, Pharynx, Palate, Tonsils.—Normal.

Submaxillary, Hyoid and Parotideal Glands.—Normal.

Retro-pharyngeal Glands.—The right had in the cortex a minute caseous focus. The left was normal.

Intestines.—Several of the Peyer's patches contained a few yellowish-white caseous foci in the lymphoid tissue; the mucous membrane here and there showed small raised congested spots which could just be felt between the finger and thumb; no caseous foci were detected on section.

Mesenteric Glands.—The mesenteric glands appeared slightly enlarged; in the cortex of every one there were several firm patches, or nodules, not definitely circumscribed and showing on section irregular caseous foci or a coarse caseous network; the areas were mostly small but some measured as much as 1 cm. in greatest diameter.

Ileo-Colic Glands.—The ileo-colic glands were in a similar condition.

Testes.—Normal.

Various Lymphatic Glands.

Precrural, Popliteal, Gluteal, Ischiatic, Pudic.—Normal.—

Microscopical Examination.

Emulsion of Prescapular Gland.—A few tubercle bacilli.

Emulsion of Prepectoral Gland.—A few tubercle bacilli.

Emulsion of Lung Tubercles.—Three tubercle bacilli seen.

Animals Inoculated.

Calf 1281 was inoculated intravenously with 18·0 cc. of an emulsion made from the left prescapular gland.

Rabbits 1524 and 1525 were inoculated subcutaneously, each with 2·0 to 3·0 cc. of the same emulsion. They were killed after 218 days; the former showed a local lesion and rather severe tuberculosis of the lungs, the latter a local lesion and slight tuberculosis of the lungs.

CALF 1279. Virus H. 80. "D.M."

Subcutaneous inoculation of an emulsion made from the lung of Calf 1265.

Dose—20·0 cc. The emulsion contained numerous tubercle bacilli.

Date of Inoculation—August 12, 1907. [Age about 7 weeks.]

Killed when in good health—March 28, 1908. [229 days after inoculation.]

Clinical Notes.

An oedematous local swelling quickly developed; this became larger and firmer and the skin over the lower part sloughed, a quantity of pus being constantly discharged; the left prescapular gland was at this time (August 22) two or three times the normal in size.

The abscess at the seat of inoculation subsequently healed; when the animal was killed only a patch of thickening and a linear scar was present in this situation, and the left prescapular gland was almost normal in size.

The calf remained well during the experiment.

Temperature.

A period of irregular pyrexia, lasting over a month, immediately followed the inoculation. On three occasions during this period there was a sharp rise to over 40·0° C. (maximum 40·5° C.) followed by a sudden return to the normal. Subsequently the temperature was irregular, but approximately normal; the maximal temperatures recorded during a period of five months were 39·0° C. and 39·8° C., the minimal 37·2° C., 37·7° C., 37·9° C.

Tuberculin Test.

The calf was not tested subsequent to inoculation.

Weight.

At death—2 cwt. 3 qrs. 0 lbs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—At the seat of inoculation there was a patch of thickened skin measuring about 12 by 3 cm. showing along the centre a white linear scar; in the subcutaneous tissues beneath there was one split-pea sized caseous and softened nodule.

Left Prescapular Gland.—The left prescapular gland was slightly larger than the right and showed in the cortex sparsely scattered irregular yellow nodules, the largest the size of a hemp seed; the majority were quite calcareous, a few were caseous.

Prepectoral, Right Prescapular and Axillary Glands.—Normal.

Liver.—Under the capsule there was a grey body about 1 mm. in diameter with a minute yellow centre. The liver was otherwise normal.

There was no sign of tuberculosis elsewhere in the body.

Microscopical Examination.

Emulsion of Left Prescapular Gland.—No tubercle bacilli seen.

Grey Body from Liver.—No tubercle bacilli seen.

Animals Inoculated.

Two guinea-pigs, Nos. 3014 and 3015, were inoculated intraperitoneally with an emulsion made from the left prescapular gland. The former died in 21 days of early general tuberculosis, the latter died in 16 days probably from a subacute infection.

One guinea-pig, No. 3106, was inoculated intraperitoneally with an emulsion made from the left bronchial gland. It was killed after 39 days and showed no sign of tuberculosis.

CALF 1281. Virus H. 80. "D.M."

Intravenous inoculation of an emulsion made from the left prescapular gland of Calf 1291.

Dose—About 18·0 cc. of emulsion in which tubercle bacilli were not numerous.

Date of Inoculation—October 2, 1907. [Age about 15 weeks.]

Killed when in good health—July 23, 1908. [295 days after inoculation.]

Clinical Notes.

The calf remained well during the experiment, and when killed ten months after inoculation was a well-grown young bull weighing 3 cwt. 2 qrs. 19 lbs.

Temperature.

On the 16th day after inoculation the temperature rose to 39·5° C. and it reached 40·8° C. on the 19th day. It then slowly fell to the normal and remained normal subsequently.

Tuberculin Test.

The calf was not tested subsequent to inoculation.

POST-MORTEM EXAMINATION.

The carcass was fat.

Local Lesion.—One of the vessels in the left ear for an inch and a half of its course was slightly thickened; on section the thickening was composed of caseo-pus, slightly gritty, surrounded by a thin fibrous wall.

Thorax.

Lungs.—The lungs were pink and crepitant; under the pleura scattered minute grey spherical bodies were seen; they were homogenous and had the consistency and appearance of glandular tissue (? tuberculous).

Thoracic Glands.—The bronchial and mediastinal glands were normal in size and showed each a few calcareous foci ranging from a millet seed to a grain of sand in size; they were all situated deeply in the substance of the glands.

Abdomen.

Liver.—Under the capsule of the liver there was a millet-seed sized calcareous focus; the organ was otherwise normal.

Portal Glands.—Normal.

There was no sign of tuberculosis elsewhere in the body.

Microscopical Examination.

Focus from Liver.—No tubercle bacilli.

Animals Inoculated.

Guinea-pig 3165 was inoculated intraperitoneally with an emulsion made from the lung. It died one day later of an acute infection.

Guinea-pigs 3166 and 3167 were inoculated intraperitoneally with an emulsion made from the left bronchial gland. They were killed after 48 and 53 days respectively and showed early general tuberculosis.

CALF 1485. Virus H. 80. "D.M."

Subcutaneous inoculation of culture derived from the mediastinal gland of Calf 1281.

Dose—60·0 milligrammes.

Date of Inoculation—October 5, 1908. [Age about 6 months.]

Killed when in good health—January 15, 1909. [102 days after inoculation.]

Clinical Notes.

An elongated firm tumour of moderate size developed at the seat of inoculation; it became soft and fluctuating, and finally opened and discharged caseo-pus.

The left prescapular gland became much enlarged (in the third week after inoculation it measured 11 cm. in length), but afterwards diminished in size (at the close of the experiment it measured 6 cm. in length).

The general health of the calf was good throughout the experiment.

Temperature.

The temperature rose on the third day to 40·4° C., and remained high (maximum 40·5° C.) for thirteen days ; the temperature subsequently was approximately normal.

Tuberculin Test.

January 7, 1909. [94 days after inoculation.] Slight reaction. Rise of temperature, 0·9° C.

Weights.

	cwt.	qrs.	lbs.
October 5, 1908	1	3	7
January 15, 1909	2	1	14

Total gain of weight.—2 qrs. 7 lbs.

Average rate of gain per week.—4·4 lbs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—The tumour at the seat of inoculation on the left side of the neck measured 10 cm. in length, and 4 cm. in thickness, and consisted of greatly thickened skin and a subcutaneous patch of pinkish fibroid tissue containing scattered calcareous grains ; the skin showed in the centre of the tumour at the bottom of a shallow depression a small ulcer, the floor of which was formed by granulation tissue, the base by the fibroid tissue which here penetrated the skin.

Left Prescapular Gland.—The left prescapular gland measured 6 by 4 by 2·5 cm., and showed about half its substance replaced by a mass of dense caseous gritty tuberculous tissue extending nearly the whole length of the gland ; in the midst of this caseous substance were two patches of white fibrous tissue.

The Right Prescapular Gland measured 5 by 2·5 by 1 cm., and was normal on section.

Prepectoral, Cervical and Axillary Glands.—Normal.

The organs and the remaining lymphatic glands were examined and found normal.

Microscopical Examination.

Emulsion of Left Prescapular Gland.—A moderate number of tubercle bacilli.

CALF 1455. Virus H. 80. "D.M."

Subcutaneous inoculation of culture derived from Guinea-pig 3014 inoculated with an emulsion of prescapular gland of Calf 1279.

Dose—47·0 milligrammes.

Date of Inoculation—May 21, 1908. [Age about 10 weeks.]

Killed when in good health—September 12, 1908. [114 days after inoculation.]

Clinical Notes.

The calf remained well during the experiment, and grew normally. The weight at death was 1 cwt. 1 qr. 24 lbs.

Temperature.

From May 25 to June 11 the temperature was very slightly raised (maximum 39·6° C.). Subsequently it was normal.

Tuberculin Test.

July 28, 1908. [68 days after inoculation.] Dose 2·0 cc. No reaction. Rise of temperature, 0·2° C.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—At the seat of inoculation on the left side of the neck there was a tense cyst measuring 7 by 5 by 3·5 cm. with caseo-purulent watery contents and fibrous wall lined with granulation tissue.

Left Prescapular Gland.—The left prescapular gland measured 5 by 2·3 by 1·1 cm. ; on section it was in places firmer than normal but there was no sign of caseation or calcification.

Right Prescapular Gland.—The right prescapular gland measured 4·5 by 2 by 1 cm. and was normal on section.

Prepectoral Glands.—On the left side one the size of a pea showed about two-thirds of its substance fibro-caseo-calcareous. Other prepectoral glands were normal.

Cervical and Axillary Glands.—Normal.

Thorax.

Lungs.—The lungs showed under the pleura a few minute soft translucent grey foci not apparently tuberculous.

Pleura, Thoracic Glands, Heart.—Normal.

Abdomen.

Omentum and Peritoneum.—On the peritoneal surface of the diaphragm there was a loosely attached lenticular fibrous nodule about 5 mm. in diameter, with calcareous foci in the centre.

There was no sign of tuberculosis elsewhere in the body.

Microscopical Examination.

Smear from Nodule on Diaphragm.—One short and thick acid-fast bacillus.

CALF 1369. Virus H. 80. "D.M."

Subcutaneous inoculation of an emulsion made from the tuberculous tissues of Guinea-pigs 2966 and 2968 ; the virus was derived from the prescapular gland of Calf 1131 through a previous series of guinea-pigs.

Dose—10·0 cc. of the emulsion, which contained very numerous tubercle bacilli.

Date of Inoculation—March 12, 1908. [Age about 15 weeks.]

Killed when in good health—August 5, 1908. [146 days after inoculation.]

Clinical Notes.

The calf remained well and grew normally.

Temperature.

During twenty-six days immediately following the inoculation the temperature was slightly raised (maximum 39·9° C.). Subsequently it was quite normal.

Weight.

At death—1 cwt. 3 qrs. 10 lbs.

POST-MORTEM EXAMINATION.

The carcass was fat.

Local Lesion.—In the subcutaneous tissues on the left side of the neck there was a patch of fibrous tissue, 6·0 cm. in greatest diameter and about 0·5 cm. in greatest thickness containing scattered calcareous tubercles; the skin over it was thickened adherent and showed a depressed scar.

Left Prescapular Gland.—The left prescapular gland measured 5·5 by 3 by 1·5 cm. and showed in the cortex three calcareo-caseous nodules varying in diameter from 1 to 2 mm.

Right Prescapular Gland.—The right prescapular gland measured 6 by 2·4 by 1·3 cm. and was normal on section.

Prepectoral, Cervical, and Axillary Glands.—Normal.

Thorax.

Lungs.—The lungs showed under the pleura a few minute grey points of a doubtful nature; with these exceptions the lungs were perfectly normal.

Thoracic Glands.—Normal.

All the remaining organs and glands were examined and found normal.

Microscopical Examination.

Emulsion of Prescapular Gland.—A few tubercle bacilli seen in each of two films examined.

Animals Inoculated.

Guinea-pig 3204 was inoculated intraperitoneally with an emulsion of the left prescapular gland (killed 40 days, early general tuberculosis); and Guinea-pig 3203 intraperitoneally with an emulsion of the left bronchial gland (killed 40 days, healthy).

CALF 1475. Virus H. 80. "D.M."

Subcutaneous inoculation of culture derived from the prescapular gland of Calf 1369.

Dose—100·0 milligrammes.

Date of Inoculation—October 9, 1908. [Age about 12 weeks.]

Killed when dying—October 31, 1908. [22 days after inoculation.]

Clinical Notes.

The calf became suddenly ill on October 30, lying on the ground and apparently unable to get up. Soon after, blood was seen issuing from the urethra; later on it was found that the tissues around the urethra from the perineum to just in front of the scrotum were swollen and indurated, and tender to the touch. It remained in this condition till the next day and no urine was passed; the signs were those of a completely obstructed urethra, and on this account the calf was killed.

POST-MORTEM EXAMINATION.

Urinary System.—The tissues around the urethra from the perineum to just in front of the scrotum were thickened brawny and very oedematous; near the scrotum there was a large mass of extravasated blood; at this point the urethra contained an irregular impacted calculus which completely blocked up the urethra; beyond the calculus the urethra for some distance was obliterated as a result of hæmorrhage into its wall.

The bladder was distended and deeply congested externally; it contained blood-red urine and large clots of blood; the mucuous membrane was thickened hæmorrhagic (almost black), and showed on its surface many small calculi; both ureters were distended, particularly the left.

Both kidneys were greatly enlarged, the left more than the right, and the tissues around them were oedematous.

The left kidney was very pale and showed on the surface numerous yellow foci and some hæmorrhagic patches; on section the tissue was oedematous; the cortex was increased in thickness, and nearly all the lobules infiltrated with yellow suppurative foci; the pelvis and calyces were dilated and their walls thickened, they contained many small calculi; the medulla of the kidneys was oedematous.

The right kidney was in a similar condition as regards the suppurative foci, but the cortex was not so pale and the medullary portions were deeply congested.

Local Lesion.—On the left side of the neck there was a lenticular subcutaneous mass 12 by 8 by 2·5 cm. composed of fibroid oedematous tissue containing caseous areas most of which were softened.

Left Prescapular Gland.—The left prescapular gland measured 7·8 by 3·5 by 2 cm.; on section the major portion of the cortex was firmer and greyer than normal and was infiltrated with yellow caseous foci or a fine yellow network.

Right Prescapular Gland.—The right prescapular gland measured 4 by 1·9 by 0·8 cm. and was normal on section.

There was no sign of tuberculosis elsewhere in the body.

Microscopical Examination.
(Smears from)

Spleen	No tubercle bacilli seen.
Bronchial Gland	
Gluteal Gland ...	

DOG 19. [Puppy.] Virus H. 80. "D.M."

Intraperitoneal inoculation of an emulsion made from the human lung.

Dose—97,500,000 T.B. [Vol. 5·0 cc. E = 19,500,000 T.B. per cc.]

Date of Inoculation—January 22, 1907.

Killed when in good health—June 11, 1907. [140 days after inoculation.]

Temperature.—A record of the temperature was kept from May 10 to June 10. During this period it was normal, the range of variation being only 0·5° C. (38·8–39·3° C.).

Tuberculin Test.—June 10. [139 days after inoculation.] Reacted. Rise of temperature, 1·1° C.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Abdomen.

Omentum and Peritoneum.—Normal.

Pyloric Gland.—A gland in the great omentum, near the pylorus, was enlarged and indurated, and showed on section tough yellowish-white caseo-necrotic patches, softened around the margins and containing scattered opaque white calcareous foci; in the rest of the gland there were yellow necrotic foci which readily broke down when scraped with a scalpel.

Gastric Glands.—One in the lesser curvature of the stomach, about 1 cm. in diameter, had a breaking down caseo-necrotic centre and a fibrous margin containing yellow points.

Coeliac Glands.—Two coeliac glands and a gland on the head of the pancreas were enlarged, and on section exuded ill-formed pus; they showed caseo-necrotic patches similar to those in the pyloric gland, which they closely resembled.

Mesenteric Glands.—The mesenteric glands showed in the cortices scattered opaque yellow foci up to about 1·5 mm. in diameter.

Spleen.—The spleen was normal in size; the Malpighian bodies conspicuous; no definite tubercles were seen.

Liver.—The surface was uneven, in places distinctly nodular, and covered almost completely with a thin grey membrane which could be readily peeled off; the capsule showed here and there a fine network of fibrous tissue, separating groups of lobules, and a few irregular cicatricial patches. On section the liver substance was paler and firmer than normal, and there was a marked increase in interstitial connective tissue; it contained fairly numerous yellow tubercles, ranging from a mere point up to a millet seed in size. They were soft, and many contained calcareous grains.

Portal Gland.—The portal gland appeared normal.

Kidneys.—On the surface of the right there was a grey spot about 1 mm. in diameter; this on section was found to extend into the cortex and to have running down its centre a whitish streak.

The left kidney was normal.

Intestines.—Normal.

Thorax.

Pleura.—Normal.

Lungs.—The lungs were crepitant and contained fairly numerous translucent grey fibrous tubercles, somewhat irregular in outline, ranging in size from about 0·5 to 2 mm. (or occasionally rather more) in diameter; one of the tubercles in a caudal lobe was opaque, otherwise the tubercles were homogeneous throughout.

Thoracic Glands.—Normal.

Heart.—Normal.

Pharynx and Tonsils.—Normal.

All the peripheral lymphatic glands were examined and found normal.

Microscopical Examination.

Liver (tubercle from).—No tubercle bacilli seen.

Spleen (scraping from).—No tubercle bacilli seen.

Lung (tubercle from).—Tubercle bacilli fairly numerous.

Gastric Gland (scraping from).—Tubercle bacilli numerous.

Coeliac Gland (scraping from).—Tubercle bacilli numerous.

Portal Gland (scraping from).—Tubercle bacilli numerous.

DOG 21. [Puppy.] Virus H. 80. "D.M."

Intraperitoneal inoculation of an emulsion made from the human lung.

Dose—97,500,000 T.B. [Vol. 5·0 cc. E = 19,500,000 T.B. per cc.]

Date of Inoculation—January 22, 1907.

Killed when in good health—July 6, 1907. [165 days after inoculation.]

Temperature.—A record of the temperature was kept from May 10 to June 10. During this period it was normal, the range of variation bein 0·9° C. (38·6–39·5° C.).

Tuberculin Test.—June 10. [139 days after inoculation.] Reacted. Rise of temperature, 1·0° C.

POST-MORTEM EXAMINATION.

Carcass.—In good condition.

Local Lesion.—The skin of the abdomen near the umbilicus showed two small ulcers with undermined margins and floors of reddish granulation tissue; leading from one of these ulcers was a sinus which communicated with the interior of a tumour in the subperitoneal tissues; this tumour was the size of a walnut and was composed of dense fibrous tissue infiltrated with opaque caseous streaks and foci.

Abdomen.

Omentum and Peritoneum.—Normal.

Mesentery.—On the mesentery there were three or four pinhead-sized grey tubercles.

Spleen.—The spleen was normal in size and showed on section spherical grey bodies the largest about a millimetre in diameter which were evidently Malpighian bodies.

Liver.—On the anterior surface there were severa irregular patches of greyish-yellow adherent lymph under one of which there were two or three flattened grey tubercles with opaque centres. The surface of the liver was granular and uneven and the substance tough; no tubercles were seen on section.

Portal Glands.—The portal glands (in the small omentum) were not enlarged; one or two whitish foci were seen.

Other abdominal lymphatic glands appeared normal.

Kidneys.—On the surface of the left two tubercles were seen, one the size of a pin's head with a slightly opaque centre, the other very small and grey. On section the cortex showed an elongated grey tubercle about 2·5 by 1 mm. with an opaque streak running down the centre, and one or two minute grey tubercles; in the medulla there was a grey tubercle the size of a millet seed.

On the surface of the right kidney there were two tubercles similar to those in the left; in the depth of the cortex there were several minute grey tubercles and one millet-seed sized grey tubercle.

Thorax.

Pleura.—Normal.

Lungs.—The lungs showed under the pleura very numerous grey tubercles ranging from 1 to 2, or occasionally more, millimetres in diameter, which in many places particularly on the dorsal surfaces had coalesced forming grey patches. A few of the tubercles were caseous in the centre, some conspicuously, others slightly, but the majority were grey and translucent throughout; on section the tubercles were found to be flattened and to extend only a short distance into the substance; in the depth of the lung grey tubercles were scattered throughout; they were much less numerous than on the surface.

Thoracic Glands.—The bronchial glands appeared to be enlarged but were not caseous. The sternal glands were normal.

Heart.—There was a miliary tubercle under the endocardium of the left ventricle. The mitral valve contained an irregular nodule about the size of a hemp seed with an opaque yellow centre.

Under the endocardium of the right auricle were three flattened grey tubercles, one with an opaque yellow centre.

Alimentary Tract.

Tongue, Pharynx, Tonsils.—Normal.

Intestines.—The small intestine showed in the submucous tissue numerous pinhead sized soft yellow foci.

Mesenteric Glands.—The mesenteric glands contained sparsely scattered greyish and greyish-white foci.

Peripheral Lymphatic Glands.—Normal.

Microscopical Examination.

(Smears from)—

Omentum } In each smear a few large segmented
Spleen } bacilli stained blue were seen.

Lung tubercle. — Tubercle bacilli in moderate numbers.

Heart tubercle.—Tubercle bacilli scanty.

Intestinal focus. } Bacilli stained blue were
Mesenteric Gland focus } seen, similar to those in omentum and spleen.

DOG 39. [Puppy.] Virus H. 80. "D.M."

Intraperitoneal inoculation of an emulsion of tissues from Guinea-pigs 2391–2394, injected with an emulsion of the prescapular gland of Calf 1141.

Dose—10·0 cc. of emulsion, containing not very numerous tubercle bacilli.

Date of Inoculation—May 28, 1907.

Killed when in good health—July 2, 1907. [35 days after inoculation.]

POST-MORTEM EXAMINATION.

Carcass.—In good condition.

Abdomen.

The peritoneal cavity contained a quantity of clear fluid.

Omentum.—The omentum was thickened, chiefly near the pylorus, and adherent to the floor of the abdomen.

Peritoneum.—The parietal peritoneum presented fairly numerous grey tubercles, most numerous on the diaphragm and in the lumbar regions.

There were fairly numerous translucent grey tubercles on the mesentery and meso-colon, varying in size.

Spleen.—The spleen was not enlarged. There were several flattened caseating tubercles on the surface; the pulp through the capsule appeared as if finely peppered with minute grey points; the whole organ was used for the emulsion and was not therefore examined internally.

Liver.—The liver was closely and evenly beset with translucent grey tubercles, the largest about 0·5 mm. in diameter.

Kidneys.—In the cortex of the right kidney there were about a dozen grey miliary tubercles. In that of the left there were four. On section a few were seen in the depth of the cortex, and in the right one was found in the medulla.

The Pyloric, Portal and Coeliac Glands were slightly enlarged and showed around the cortex greyish-white patches of early caseation.

The Lumbar Glands were slightly enlarged, but no caseous foci were seen.

The Iliac Glands were slightly enlarged, and one showed a small early caseous patch

Thorax.

Pleura.—Normal.

Lungs.—The lungs collapsed normally and were crepitant throughout; they contained sparsely scattered miliary tubercles with caseous centres and grey margins.

Bronchial Glands.—Normal.

Sternal Glands.—These were slightly enlarged, and similar to the portal and coeliac glands.

Heart.—Normal.

Alimentary Tract.

Tongue and Pharynx, and Glands of the Throat and Neck.—Normal.

Instestines and Mesenteric Glands.—Normal.

Microscopical Examination.

Emulsion (see below).—Numerous tubercle bacilli, long and beaded; many clumps.

Scraping from Liver.—Fairly numerous tubercle bacilli, many in cells.

Scraping from Spleen.—Tubercle bacilli sparsely scattered, generally in cells.

Animals Inoculated.

One calf No. 1255 (dose 20·0 cc.), and three rabbits, Nos. 1366, 1367, 1368, (doses 1·0 cc. each), were inoculated subcutaneously with an emulsion made from the omentum, the spleen, and the sternal, portal and coeliac glands of the dog. One rabbit died in 5 days, the cause of death not being apparent; another died in 125 days and showed a local lesion and a few tubercles in the lungs, the third was killed after 149 days and showed a local lesion and slight tuberculosis of the lungs.

DOG 41. [Puppy.] Virus H. 80. "D.M."

Intraperitoneal inoculation of an emulsion of tissues from Guinea-pigs 2391–2394, injected with an emulsion of the prescapular gland of Calf 1141.

Dose—10·0 cc. of emulsion containing not very numerous tubercle bacilli.

Date of Inoculation—May 28, 1907.

Killed when in good health—July 3, 1907. [36 days after inoculation.]

POST-MORTEM EXAMINATION.

Carcass.—In good condition.

Abdomen.

There was no fluid in the peritoneal cavity.

Omentum.—The omentum was moderately thickened and composed of firm grey tissue containing here and there a caseous focus.

Peritoneum.—The parietal peritoneum, mesentery, and meso-colon showed sparsely scattered grey tubercles.

Spleen.—The spleen was not enlarged; there were a few flattened tubercles on the surface; on section the Malpighian bodies were enlarged, but no tubercles were seen.

Liver.—The liver was moderately closely beset with grey tubercles, the largest about 0·5 mm. in diameter.

Portal and Coeliac Glands.—These glands were slightly enlarged, their cortices were slightly more opaque than normal, but there was no definite caseation.

Pyloric and Iliac Glands.—These were slightly enlarged, but not caseous.
Other abdominal lymphatic glands were normal.

Kidneys.—In the cortex of the right there was one grey miliary tubercle; none was seen in the left.

Suprarenal Bodies.—Normal.

Thorax.

Pleura.—Normal.

Lungs.—The lungs were normal in general appearance and contained very sparsely scattered tubercles up to 1 mm. in diameter, the larger ones caseous in the centre, the smaller ones grey and translucent; there were not more than twelve in both lungs.

Thoracic Glands.—Normal

Heart.—Normal.

Alimentary Tract.

Tongue and Pharynx.—Normal.

Glands of the Throat and Neck.—Normal.

Intestines.—Normal.

Mesenteric Glands.—Normal.

The Peripheral Lymphatic Glands were examined and found to be normal.

Microscopical Examination.

Emulsion (see below).—Fairly numerous tubercle bacilli, many very long, curved and beaded; the bacilli were not so numerous as in the emulsion made from Dog 39.

Scraping from the Liver.—A few tubercle bacilli seen.

Animals Inoculated.

An emulsion was made from the omentum, the spleen, and some of the abdominal lymphatic glands.
Calf 1265 was inoculated intravenously.
Rabbits 1371, 1372 were inoculated subcutaneously; one died prematurely in 3 days; the other was killed after 135 days and showed a local lesion and a moderate number of caseous nodules in the lungs.

VIRUS H. 81. "P.W."

TUBERCULOSIS OF THE LUNG.

VIRUS H. 81. “P.W.” [Lung.]

JANUARY 30, 1907.

Emulsion of lung, estimated to contain 303,500,000 T.B. per cc.

CALF 1129.

Subcutaneous.
Dose : 3,035,000,000 T.B.
Killed when well :
May 18, 1907.
108 days.

P.M.—At the seat of inoculation there was a fibro-calcareo-caseous patch surmounted by thickened skin ; about half the prescapular gland and the whole of a gland adjacent to it was composed of fibro-calcareo-caseous tissue. There was no tuberculosis elsewhere.

Emulsion of prescapular gland.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1293	Subcut.	1·0 cc.	K. 124 days	Local lesion and slight T. of the lung.
1294	Subcut.	1·0 cc.	D. 3 ”	Psorospermosis.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
2214	Intrap.	303,500,000 T.B.	D. 15 days	T.
2215	Intrap.	75,875,000 T.B.	D. 27 ”	G. T.

CALF 1145.

Subcutaneous.
Dose : 3,035,000,000 T.B.
Killed when well :
May 10, 1907.
100 days.

P.M. — Large fibroid local tumour (collapsed abscess). Very large cystic prescapular gland containing pus and caseo-calcareous masses. In the lungs, liver, and spleen were sparsely scattered calcareous tubercles ; there were three in the small intestine, one in a suprarenal. Nearly all the lymphatic glands contained one or more caseo-calcareous tubercles ; in the thoracic glands caseo-calcareous nodules were numerous.

GUINEA-PIGS.

—	Number.	Method.	Duration of Life.	Result.
E. of mediastinal gland.	2431	Intrap.	K. 32 days	G. T.
	2432	Intrap.	K. 32 ”	G. T.
	2433	Intrap.	K. 32 ”	G. T.
	2434	Intrap.	K. 32 ”	G. T.
E. of spleen	2435	Intrap.	K. 102 ”	Chronic G. T.
E. of ileo-colic gland.	2436	Intrap.	D. 94 ”	Chronic G. T.
E. of ischiatic gland.	2437	Intrap.	K. 102 ”	Chronic G. T.

RABBITS.

—	Number.	Method.	Duration of Life.	Result.
E. of mediastinal gland.	1290	Subcut.	K. 99 days	Local lesion and two tubercles in the lung.
E. of prescapular gland.	1291	Subcut.	K. 99 ”	Local lesion only.
	1292	Subcut.	K. 99 ”	Local tuberculosis only.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1124	Intrap.	303,500,000 T.B.	D. 20 days	Septic peritonitis ; no sign of T.
1125	Intrap.	75,875,000 T.B.	D. 49 ”	Subacute infection ; no obvious sign of T.

VIRUS H. 81. "P.W."—*continued.*

LUNG.

CULTURE INOCULATIONS.

I.—APRIL 12, 1907.

The strain was derived from the original material, and had been in cultivation a total period of 72 days.

The culture used was the 5th generation, 21 days old.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1251	Intrav.	1·0 mg.	D. 81 days	Slight T. of lungs and kidneys. (?) cause of death.
1252	Intrav.	0·1 mg.	K. 161 ,,	Very slight T. of lungs.
1253	Intrap.	10·0 mg.	K. 161 ,,	Chronic T. of peritoneum, lungs, and kidneys.
1254	Subcut.	10·0 mg.	K. 161 ,,	Local T. and slight T. of lungs.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
2340	Intrap.	0·1 mg.	D. 35 days	G. T.
2341	Subcut.	0·1 mg.	D. 137 ,,	G. T.

RATS

Number.	Method.	Dose.	Duration of Life.	Result.
54	Intrap.	10·0 mg.	D. 58 days	Acute T. No visible lesions; no apparent cause for death.
55	Subcut.	10·0 mg	D. 454 ,,	No visible lesions. T.B. in lungs, none in spleen. Cause of death not apparent.

CULTURE

derived from the lung of Rat 55.

RABBITS.

—	Number.	Method.	Dose.	Duration of Life.	Result.
4th generation, 12 days old. Sept. 1, 1908.	1982	Subcut.	About 20–25 mg.	K. 125 days	Local lesion only.
	1983	Subcut.	Do.	K. 125 ,,	Local lesion and two nodules in the lung.
8th generation, 15 days old. Oct. 29, 1908.	2052	Subcut.	One serum culture.	K. 168 ,,	Local lesion only.

DOG 35.

Fed.

Dose : 50·0 mg.

Killed : 102 days

P.M.—Normal throughout.

CAT 39.

Fed.

Dose : 50·0 mg.

Killed : 110 days.

P.M.—Normal throughout.

CALF 1211.

Subcutaneous.

Dose : 50·0 mg.

Killed : August 14, 1907.

124 days.

P.M.—At the seat of inoculation there was a cystic tumour. The left prescapular gland contained two small calcareous nodules and some calcareous grains; one prepectoral gland was fibro-calcareo-caseous throughout. In the lungs three small grey tubercles were seen.

VIRUS H. 81. "P.W."—*continued.*

LUNG.

CULTURE INOCULATIONS—*continued.*

II.—MAY 29, 1907.

The strain was derived from the original material, and had been in cultivation a total period of 120 days. The culture used was the 8th generation, 21 days old.

RHESUS MONKEY 95.

Subcutaneous.

Dose: 1·0 mg.

Died: July 14 1907.
45 days.

P.M.—General tuberculosis.

RHESUS MONKEY 97.

Subcutaneous.

Dose: 0·001 mg.

Died: July 17, 1907.
48 days.

P.M.—General tuberculosis.

RHESUS MONKEY 99.

Subcutaneous.

Dose: 0·00001 mg.

Died: July 18, 1907.

49 days.

P.M.—General tuberculosis.

CULTURE.

Derived from the spleen. The 4th generation, 29 days old, was used for inoculation on September 18, 1907.

RABBIT 1505.

Subcutaneous.

Dose: One serum tube.

Died in 273 days.

P.M.—Local lesion and slight T. of lungs and omentum. The cause of death was not apparent.

CHIMPANZEE 7.

Subcutaneous.

Dose: 0·00001 mg.

Died: August 29, 1907.
92 days.

P.M.—General tuberculosis.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
2451	Intrap.	0·00001 mg.	D. 320 days	Chronic G.T.
2452	Intrap.	0·00001 mg.	D. 169 "	G.T.
2453	Subcut.	0·00001 mg.	D. 188 "	G.T.
2454	Subcut.	0·00001 mg.	D. 184 "	Chronic G.T.

VIRUS H. 81. "P.W."—*continued.*

LUNG.

Culture Inoculations—*continued.*

III.—August 6, 1907.

The strain was derived from the original material, and had been in cultivation a total period of 190 days.

The culture used was the 12th generation, 21 days old.

DOG 43 (Puppy).

Intravenous.

Dose : 1·0 mg.

Died : 33 days.

P.M. — The lungs were air-containing; they showed everywhere numerous small tubercles with opaque centres. The bronchial and portal glands were in an early stage of caseation. The spleen was very large, and showed numerous opaque points and foci. T.B. were numerous in the liver, spleen, and infected glands; none were seen in smears from the kidney or suprarenal. The immediate cause of death appeared to be rupture of an omental blood-vessel.

PARROT 1.

Intravenous.

Dose : 2·0 mg.

Died : 20 days.

P.M.—General tuberculosis.

PARROT 3.

Intravenous.

Dose : 10·0 mg.

Died : 9 days

P.M.—The lungs were almost entirely airless, dark red in colour and oedematous. The spleen was (?) enlarged, the liver pale. T.B. were numerous in smears from the lung, liver, spleen, and kidney.

IV.—September 13, 1907

The strain was derived from the original material, and had been in cultivation a total period of 227 days.

The culture used was the 14th generation, 22 days old

HORSE 1.

Subcutaneous.

Dose : 50·0 mg.

Killed : January 7, 1908.

116 days.

P.M.—There was a series of small softened caseous nodules in the subcutaneous tissues at the seat of inoculation, a pea-sized caseous nodule in one of the left prescapular glands and no tuberculosis elsewhere.

GUINEA-PIGS.

	Number.	Method.	Duration of Life.	Result.
Emulsion of spleen.	2864	Intrap.	K. 115 days	Healthy.
Emulsion of left prescapular gland.	2865	Intrap. and Subcut.	D. 78 "	G.T.
	2866	Intrap.	D. 106 "	G.T. severe.
Emulsion of liver, containing a small hydatid cyst.	2867	Intrap.	D. 43 "	No T.

HORSE 3.

Fed.

Dose : between 100·0 and 150·0 mg.

Killed : January 21, 1908.

130 days.

P.M.—No tuberculosis.

GUINEA-PIGS.

	Number.	Method.	Duration of Life.	Result.
Emulsion of spleen.	2902	Intrap.	D. 27 days	No T.
Emulsion of liver.	2903	Intrap.	K. 56 "	Healthy.
Emulsion of bronchial gland.	2904	Intrap.	K. 56 "	Healthy.
Emulsion of submaxillary gland.	2905	Intrap.	D. 56 "	No T.

VIRUS H. 81. "P.W."—*continued.*

LUNG.

CULTURE INOCULATIONS—*continued.*

V.—OCTOBER 28, 1907.

The strain was derived from the original material, and had been in cultivation a total period of 272 days. The culture used was the 17th generation, 21 days old.

PARROTS.

Number.	Method.	Dose.	Duration of Life.	Result.
5	Intrav.	0·1 mg.	K. 298 days	A few minute grey tubercles in liver and kidneys and four yellow tubercles on peritoneum. T.B. in lung.
7	Intrap.	1·0 mg.	D. 129 „	Tuberculous peritonitis only.
9	Intra-muscular.	10·0 mg.	K. 269 „	General tuberculosis (not severe).
11	Fed	50·0 mg.	D. 73 „	Caseous tubercles in cervical glands; larynx filled with cheesy caseous substance; caseous deposits in the bronchi of one lung and in the subpleural and subperitoneal spaces (result due to inhalation of the bacilli). Scattered minute grey foci in liver; numerous minute tubercles in spleen; other organs free from tubercles.

MICE.

Number.	Method.	Dose.	Duration of Life.	Result.
25	Intrap.	50·0 mg.	D. 12 days	Acute tuberculosis.
26	Subcut.	50·0 mg.	D. 61 „	Local tuberculosis; no lesions in the organs. T.B. seen in a smear from the spleen.

CULTURE

Derived from the liver of Parrot 9. The 4th generation, 14 days old, was used on September 25, 1908, for inoculating:

FOWLS.

Number	Method.	Dose.	Duration of Life.	Result.
131	Intrav.	40·0 mg.	D. 51 days	No definite tuberculous lesions were seen and the cause of death was not apparent.
129	Intrav.	10·0 mg.	K. 267 „	No tuberculosis (a guinea-pig inoculated with an emulsion of the lung showed G. T. when killed after 69 days).

GUINEA-PIGS (inoculated from Parrot 9).

	Number.	Method.	Duration of Life.	Result.
Emulsion of spleen	3168	Intrap.	D. 59 days	G.T.
Emulsion of lung	3169	Intrap.	D. 79 „	Severe G.T.

GUINEA-PIGS (inoculated from Parrot 5).

	Number.	Method.	Duration of Life.	Result.
Emulsion of spleen	3220	Intrap.	D. 6 days	No T.
Emulsion of lung	3221	Intrap.	K. 43 „	Chronic G.T.

VIRUS H. 81. “P.W.”—*continued.*

CALF PASSAGES.

BEGINNING WITH A TISSUE EMULSION MADE FROM TUBERCULOUS HUMAN LUNG.

PASSAGE *a*.

An emulsion made from the human lung was inoculated on January 30, 1907. It was estimated to contain about 303,500,000 T.B. per cc.

CALF 1129.

Subcutaneous.

Dose : 3,035,000,000 T.B.

Killed : May 18, 1907.

108 days.

P.M.—At the seat of inoculation there was a fibro-calcareo-caseous patch surmounted by thickened skin ; about half the prescapular gland and the whole of a gland adjacent to it was composed of fibro - calcareo - caseous tissue. There was no tuberculosis elsewhere.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1124	Intrap.	303,500,000 T.B.	D. 20 days	Septic peritonitis ; no sign of T.
1125	Intrap.	75,875,000 T.B.	D. 49 „	Subacute infection ; no obvious sign of T.

Emulsion of prescapular gland.

CALF 1239.

Subcutaneous.

Dose : 14·0 cc. of emulsion.

Killed : Aug. 13, 1907.

87 days.

P.M.—There was a cyst containing caseopus and caseous masses at the seat of inoculation. The left prescapular gland was largely composed of caseo-calcareous masses. In the lung there was one, and in the thoracic glands a few, minute calcareous grains. In the liver two small greyish nodules were seen.

RABBIT.

Number.	Method.	Dose.	Duration of Life.	Result.
1293	Subcut.	1·0 cc.	K. 124 days	Local lesion and slight T. of lung.

Emulson of prescapular gland (T.B. not very numerous).

CALF 1285.

Subcutaneous.

Dose : 20·0 cc. of emulsion.

Killed : November 9, 1907.

88 days.

P.M.—At the seat of inoculation there was a very slightly thickened patch containing half-a-dozen translucent pinhead tubercles ; there was no tuberculosis elsewhere.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1443	Subcut.	4·0 cc.	K. 182 days	Local lesion and a few tubercles in the lungs.
1444	Subcut.	4·0 cc.	K. 182 „	Local lesion and slight T. of the lungs.

Emulsion of prescapular gland into :

GUINEA-PIG 2707.

Killed : 23 days. Early G.T.

Emulsion of various tissues into :

GUINEA-PIGS 2818-2820.

Killed : 32 days. G. T.

JANUARY 3, 1908. Emulsion of G.P.'s tissues (T.B. numerous).

CALF 1323.

Intravenous.

Dose : 20·0 cc. of emulsion.

Died : January 20, 1908.

17 days.

P.M.—Acute tuberculosis.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1641	Subcut.	2·0 cc.	K. 192 days	Local lesion and slight T. of lungs.
1642	Subcut.	4·0 cc.	K. 192 „	Local T. and slight T. of lungs.

Emulsion of long mediastinal gland (T.B. moderately numerous).

CALF 1313.

Intravenous.

Dose : 10·0 cc. of emulsion.

Killed when dying : February 18, 1908.

29 days.

P.M.—General tuberculosis.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1690	Subcut.	3·0 cc.	K. 215 days	Local lesion, T. of lungs and mammary gland.
1691	Subcut.	3·0 cc.	K. 249 „	Local lesion and slight T. of lungs.

Emulsion of liver (T.B. numerous).

CALF 1359.

Intravenous.

Dose : 10·0 cc. of emulsion.

Died : April 6, 1908.

48 days.

P.M.—Tuberculosis of lungs, thoracic glands, heart, and small intestines.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1733	Subcut.	2·5 cc.	K. 242 days	Local T., slight T. of lungs, one tubercle in a kidney.
1734	Subcut.	2·5 cc.	K. 367 „	Local lesion and very slight T. of lungs and kidneys.

Emulsion of left bronchial gland (T.B. moderately numerous).

CALF 1399.

Subcutaneous.

Dose : 14·0 cc. of emulsion.

Killed : August 4, 1908.

120 days.

P.M.—The local tumour consisted of a thick fibrous-walled cyst with caseo-purulent contents. The left prescapular gland contained a calcareous nodule and a few calcareous grains. One mesenteric and one ileo-colic gland contained some calcareous foci.

CULTURE.

Derived from the prescapular gland of Calf 1399. The 5th generation was used for inoculation, when 10 days old, on October 13, 1908 ; the total duration of artificial cultivation was 70 days.

CALF 1499.

Subcutaneous.

Dose : 200·0 mg.

Killed : February 2, 1909.

112 days.

P.M.—The local tumour was composed of caseo-purulent substance surrounded by a fibrous wall, and of greatly thickened skin. The left prescapular gland contained calcareous patches and nodules ; one left cervical gland showed a group of calcareo-caseous tubercles. There was no tuberculosis elsewhere.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2038	Subcut.	50·0 mg.	K. 157 days	Local T., moderately severe chronic T. of lungs and slight T. of kidneys.
2039	Subcut.	50·0 mg.	K. 157 „	Local lesion and one tubercle in a kidney.

VIRUS H. 81. "P.W."—*continued.*

CALF PASSAGES.

BEGINNING WITH A TISSUE EMULSION MADE FROM A TUBERCULOUS HUMAN LUNG.

PASSAGE β.

An emulsion made from the human lung was inoculated on January 30, 1907 It was estimated to contain about 303,500,000 T.B. per cc.

CALF 1145.
Subcutaneous.
Dose : 3,035,000,000 T.B.
Killed : May 10, 1907.
100 days.

P.M.—There was a very large local tumour composed mainly of fibroid tissue (a collapsed abscess). The left prescapular gland was very much enlarged and was a loculated cyst containing pus and caseo-calcareous masses. In the lungs, liver, and spleen were sparsely scattered calcareous tubercles; there were three in the small intestine and one in a suprarenal. Nearly all the lymph glands contained one or more caseo-calcareous tubercles; in the thoracic glands there were numerous caseo-calcareous nodules and patches.

Emulsion of mediastinal gland into :
GUINEA-PIGS 2431-2434.
Killed : 32 days. G. T.

RABBITS.

—	Number.	Method.	Duration of Life.	Result.
Emulsion of mediastinal gland.	1290	Subcut.	K. 99 days	Local lesion and two tubercles in the lung.
Emulsion of prescapular gland.	1291	Subcut.	K. 99 „	Local lesion only.
	1292	Subcut.	K. 99 „	Local tuberculosis only.

JUNE 11, 1907. Emulsion of lesions from Guinea-pigs 2431–2434 (T.B. not very numerous).

CALF 1215.
Subcutaneous.
Dose : 10·0 cc. of emulsion.
Killed : August 14, 1907.
64 days.

P.M.—Small fibro-caseous local tumour. Few gritty foci in left prescapular and thoracic glands; one prepectoral gland caseous almost throughout. A few minute foci were seen in the liver, and there was a single focus in one portal, one coeliac, one mesenteric, and one precrural glands.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1331	Subcut.	2·0 cc.	K. 129 days	Local lesion and a few tubercles in the lungs.
1332	Subcut.	2·0 cc.	K. 129 „	Local lesion and three nodules in the lungs.

CALF 1223.
(For continuation of this branch of the passage experiment see next chart.)

Emulsion of prescapular gland into :
GUINEA-PIGS 2563-2564.
Killed : 28 days. Slight G. T.

SEPTEMBER 11, 1907. Emulsion of lesions from Guinea-pigs 2563—2564 (T.B. fairly numerous).

CALF 1307.
Subcutaneous.
Dose : 20·0 cc. of emulsion.
Killed : January 8, 1908.
119 days.

P.M.—Small fibro-calcareous tumour at seat of inoculation. A fibro-calcareous patch occupied about a quarter of the cortex of the left prescapular gland. There was no tuberculosis elsewhere.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1493	Subcut.	3·0 cc.	K. 210 days	Local lesion only.
1494	Subcut.	3·0 cc.	K. 210 „	Local T. and slight T. of lungs.

Emulsion of prescapular gland into :
GUINEA-PIGS 2873-2875.
Killed : 29 days. Early G. T.

FEBRUARY 6, 1908. Emulsion of tissues from Guinea-pigs 2873–2875 (T.B. fairly numerous).

CALF 1357.
Subcutaneous.
Dose : 20·0 cc. of emulsion.
Killed : July 31, 1908.
176 days.

P.M. — Small fibroid local lesion beset with calcareous foci and containing a few caseo-calcareous nodules. The left prescapular gland contained two calcareous nodules. There were some doubtful foci in the lung.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1718	Subcut.	5·0 cc.	K. 239 days	Local lesion only.
1719	Subcut.	4·0 cc.	D. 205 „	Local lesion and T. of lungs.

CULTURE.

Derived from the prescapular gland of Calf 1357. The 5th generation was used for inoculation on October 5, 1908, when 14 days old; the total duration of artificial cultivation was 66 days.

CALF 1469.
Subcutaneous.
Dose : 100·0 mg.
Killed : January 18, 1909.
105 days.

P.M.—There was a patch of thickened skin at the seat of inoculation with a well-healed scar on the surface. The left prescapular gland was enlarged and consisted almost entirely of three softened caseous masses with thick fibrous walls. There was no tuberculosis elsewhere.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2025	Subcut.	10·0 mg.	K. 151 days	Local lesion and slight T. of lungs.
2026	Subcut.	10·0 mg.	K. 151 „	Local lesion and one tubercle in the lung.

VIRUS H. 81. "P.W."—*continued.*

CALF PASSAGE β (*completed*).

CALF 1223.

Intravenous.

Dose: 10·0 cc. of an emulsion of tissues (T.B. not very numerous) from Guinea-pigs 2431–2434. (*See preceding Chart.*)

Killed: November 13, 1907.

155 days.

P.M.—The lungs contained a moderate number of minute glassy tubercles. The thoracic glands contained calcareous patches and foci; there was an occasional focus in a few other glands and four were found in the heart muscle.

Emulsion of thoracic glands into:

GUINEA-PIG 2716.

Killed: 28 days. Early G.T.

Emulsion of various tissues of G.P. 2716 into:

GUINEA-PIGS 2845–2846.

Killed: 27 days. Early G.T. (not severe).

JANUARY 7, 1908. Emulsion of tissues from G.P.'s 2845–6 (T.B. in moderate numbers).

CALF 1335.

Subcutaneous.

Dose: 20·0 cc. of emulsion.

Killed: July 22, 1908.

197 days.

P.M.—Small local lesion composed of caseo-pus in a fibrous wall. The prescapular gland was normal. The lungs showed scattered translucent tubercles under the pleura. There was no tuberculosis elsewhere.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1645	Subcut.	2·0 cc.	K. 224 days	Local lesion and two tubercles in lungs.
1646	Subcut.	2·0 cc.	K. 224 ,,	Local lesion and a few minute tubercles in lungs.

FOWL PASSAGE.

CULTURE

Derived from the original material. Inoculated on October 28, 1907. Total duration of artificial cultivation: 272 days.

FOWL 67.

Intravenous.

Dose: 50 mg.

Killed: April 28, 1908.

183 days.

P.M.—No sign of tuberculosis.

CULTURE.

The strain was derived from the pyloric gland of a guinea-pig which had been inoculated with an emulsion of the lung and spleen of the fowl. The 4th generation of culture was used on September 10, 1908, when 9 days old, for inoculating:

RABBIT 2000.

Intravenous.

Dose: 0·1 mg.

Killed after 170 days.

P.M.—One minute grey tubercle in the lung only.

FOWL 125.

Intravenous.

Dose: 24·0 mg.

Killed after 282 days.

P.M.—No tuberculosis. Two guinea-pigs inoculated with an emulsion of the lung were killed after 69 days and found healthy.

INOCULATIONS WITH TWO STRAINS OF CULTURE DERIVED FROM CALF 1145.

PRESCAPULAR GLAND.

AUGUST 1, 1907.

The strain was derived from the prescapular gland of Calf 1145, and had been in cultivation a total period of 83 days.

The culture used was the 3rd generation, 21 days old.

CATS.

Number.	Method.	Dose.	Duration of Life.	Result.
45	Intra-peritoneal.	50·0 mg.	D. 84 days	Spontaneous tuberculosis.
47	Subperitoneal	10·0 mg.	D. 74 ,,	Caseous local lesion and no tuberculosis elsewhere. Parasitic nodules in lungs.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1404	Subcut.	10·0 mg.	K. 135 days	Local lesion and a few tubercles in the lungs.
1405	Subcut.	10·0 mg.	K. 135 ,,	Local T. and very slight T. of lungs.

ISCHIATIC GLAND.

AUGUST 6, 1907.

The strain was derived from the ischiatic gland of Calf 1145, and had been in cultivation a total period of 88 days.

The culture used was the 5th generation, 22 days old.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1410	Subcut.	50·0 mg.	K. 130 days	Local lesion and slight T. of lungs.
1411	Subcut.	50·0 mg.	K. 130 ,,	Local lesion and slight T. of lungs.

CALF 1129. Virus H. 81. "P.W."

Subcutaneous inoculation of an emulsion made from the human lung (*see below* Calf 1145).

Dose—3,035,000,000 T.B. [Vol. 10·0 cc. E = 303,500,000 T.B. per cc.]

Date of Inoculation—January 30, 1907. [Age about 5½ months.]

Killed when in good health—May 18, 1907. [108 days after inoculation.]

Clinical Notes.

A tumour of moderate size developed at the seat of inoculation on the left side of the neck; fifteen days after inoculation the tumour was flat and measured 12·5 by 7·5 cm., the skin over it was necrosed. The adjacent prescapular gland was at this time moderately enlarged, measuring about 7·5 cm. in length; a tense gland the size of a walnut was felt between the skin and the prescapular gland.

The tumour subsequently became soft and fluctuating, then opened and discharged its caseous contents, and diminished considerably in size.

The calf remained in good health during the experiment.

Temperature.—On the 14th day the temperature rose to 39·9° C. reaching 40·8° C. on the 17th day. It then fell, was normal on the 25th day, and remained normal during the remaining period of the experiment.

Tuberculin Test.—The calf was not tested subsequent to inoculation.

Weight.—The calf was not weighed at the commencement of the experiment. When killed on May 18 it was a fat well-grown animal and weighed 3 cwt. 9 lbs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—The local lesion consisted of thickened skin and a flat patch, 5 cm. in greatest diameter, of fibrous connective tissue containing nodules varying up to 1 cm. in diameter; on section these nodules were either caseous and softened with fibrous margins or were composed of fibroid tissue beset with calcareous particles; the skin showed a small superficial healing ulcer covered with dried caseo-pus.

Left Prescapular Gland.—The left prescapular gland was enlarged, measuring 7·5 by 4 by 2 cm. It showed on section at one extremity a large fibro-calcareo-caseous mass—translucent fibroid tissue closely beset with calcareo-caseous tubercles; at the other extremity was a similar but smaller mass; about half the gland was replaced by tuberculous tissue.

External to the prescapular gland between the skin and superficial muscles there was a gland 2 cm. in greatest diameter which was composed partly of caseo-purulent material and partly of fibro-calcareo-caseous tissue; the capsule of this gland was much thickened.

Right Prescapular Gland.—The gland measured 4·5 by 2·5 by 1·2 cm. and was normal on section.

Prepectoral and Axillary Glands. –Normal.

Thorax.

Pleura, Lungs, Thoracic Glands, Heart.—Normal.

Abdomen.

Omentum and Peritoneum; Spleen, Liver, Portal Glands; Kidneys, Suprarenals; Renal, Lumbar, and Iliac Glands.—Normal.

Alimentary Tract.

Tongue, Pharynx, Palate, Tonsils; Pharyngeal, Hyoid, Submaxillary and Parotideal Glands; Intestines and Mesenteric Glands.— Normal.

Various Lymphatic Glands.

Precrural, Popliteal, Gluteal and Ischiatic, Pudic. —Normal.

Animals Inoculated.

One calf, No. 1239, and two rabbits, 1293, 1294, were inoculated subcutaneously with an emulsion made from the left prescapular gland. One of the rabbits died of psorospermosis after 3 days, the other was killed after 124 days and showed chronic retrogressive tuberculosis of the usual type.

CALF 1145. Virus H. 81. "P.W."

Subcutaneous inoculation of an emulsion of caseating consolidated tissue removed from the right apex of a human lung.

Dose—3,035,000,000 T.B. [Vol. 10·0 cc. E = 303,500,000 T.B. per cc.]

Date of Inoculation—January 30, 1907. [Age about 5½ months.]

Killed when in good health—May 10, 1907. [100 days after inoculation.]

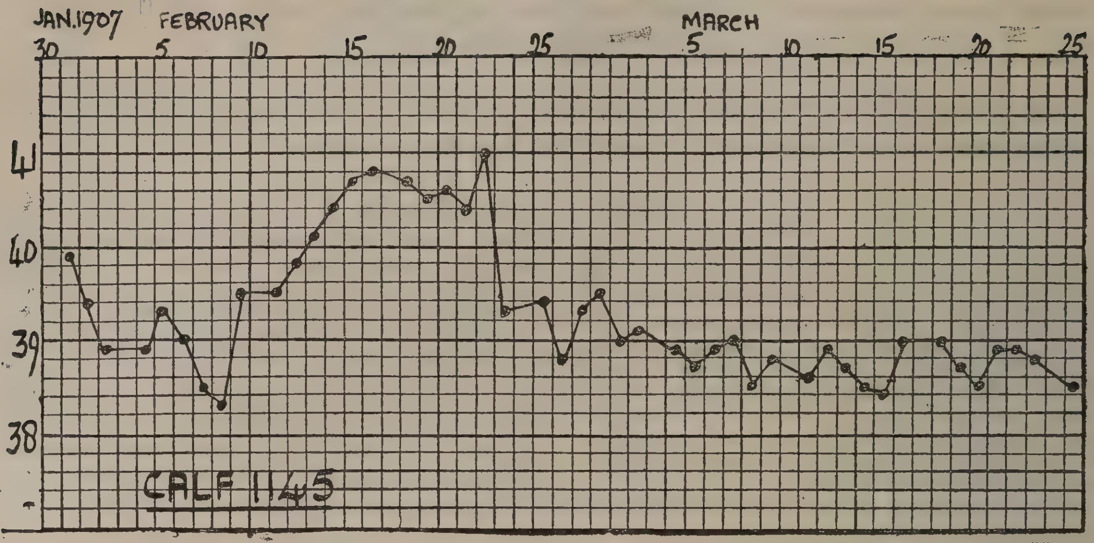
Clinical Notes.

At the seat of inoculation on the left side of the neck an elongated swelling extending into the dewlap developed, the lower part of which broke down, discharging pus; the tumour on the 15th day measured 17·6 cm. in length by about 7·5 cm. in breadth. The adjacent prescapular gland was considerably enlarged.

Both the tumour and gland subsequently increased in size; the latter became soft and fluctuating

The calf remained well during the experiment.

Temperature. (Chart to March 25.)



From March 25 to May 10, when the calf was killed, the temperature remained normal.

Tuberculin Test.—The calf was not tested subsequent to inoculation.

Weight.—The animal was not weighed previous to inoculation; when killed it was a well-grown young bull, and weighed 3 cwt. 0 qr. 4 lbs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—At the seat of inoculation on the left side of the neck there was an elongated tumour measuring 25 by 8 by 2 cm. which extended from the middle of the neck into the dewlap; the skin about the middle of the tumour showed a small ulcer, the floor of which was covered with pale granulations; in the centre of the ulcer there was the opening of a sinus which penetrated a short distance into a patch of pinkish fibroid tissue. On section the tumour was composed of dense white fibrous tissue containing nodules which varied in size up to 1·5 cm. in diameter; these nodules had fibrous margins, lined internally with granulation tissue, and yellow (in some cases greenish) purulent contents; they were most numerous at the extremities of the tumour, particularly the inferior, and were very scanty in the central part. There were a few similar nodules in the muscles between the local tumour and the prescapular gland.

In the subcutaneous tissues between the inferior extremity of the tumour and the sternum there were numerous discrete nodules ranging in size up to a hemp seed; all these had translucent fibrous margins and yellow centres which in the smaller ones were calcareous, in the larger purulent and gritty.

Left Prescapular Gland.—The left prescapular gland was much enlarged (10 by 8 by 5 cm.), irregular in outline, soft and fluctuant; on section it was found to be a loculated cyst filled with curdy pus and breaking-down caseo-calcareous masses; the walls of the cyst varied in thickness, some parts being quite thin, others very thick and formed partly by glandular tissue beset with yellow calcareous tubercles.

Prepectoral Glands.—On the left side the spherical gland contained one caseo-calcareous tubercle; in the reniform gland there were about half-a-dozen yellow caseo-calcareous tubercles up to a millet seed in size.

The glands on the right side contained one or two similar tubercles.

Right Prescapular Gland.—The right prescapular gland measured 6 by 3 by 1·5 cm.; on section three yellow softened gritty nodules were seen in the cortex.

Cervical Glands.—Of the cervical glands on the left side of the neck one near the inferior extremity of the tumour was composed almost throughout of soft cheesy gritty material, another situated about the middle of the neck showed about a third of its substance in a similar condition.

The upper cervical gland on the left side resembled the left lower cervical gland.

Other cervical glands were normal.

Axillary Glands.—The right contained one hempseed sized caseo-calcareous nodule, the left appeared normal.

Thorax.

Pleura.—Normal.

Lungs.—The lungs were pinkish and crepitant throughout; they showed immediately under the pleura sparsely scattered calcareous tubercles with grey margins ranging in size from a pin's head to a millet seed; similar tubercles were seen on section of the lung.

Thoracic Glands.—The bronchial and mediastinal glands were perhaps slightly enlarged; the caudal gland felt distinctly nodular. On section they showed in the cortex irregular patches and nodules of various sizes composed of a friable mortary caseo-calcareous substance, which could be readily scraped away in the case of the larger masses from a thin fibrous capsule which surrounded them. The masses were situated rather deeply in the cortex and were separated from the capsule by a zone of normal looking gland tissue.

Larynx and Trachea.—Normal.

Heart and Pericardium.—Normal.

Abdomen.

Omentum and Peritoneum.—Normal.

Liver.—The liver showed under the capsule altogether about a dozen translucent tubercles, the largest about the size of a millet seed. A few of these had calcareous centres.

On section in the depth of the liver scattered nodules varying in size from a millet seed to that of a pea were seen; the larger ones were composed throughout of whitish yellow fibrous tissue without central caseation; most of the smaller ones had calcareous centres.

Portal Glands.—The portal glands, not enlarged, showed in the cortices sparsely scattered miliary caseo-calcareous tubercles.

Spleen.—The spleen contained about 15 yellow calcareous tubercles with grey margins up to 2 mm. in diameter, and a pea-sized fibrous nodule with yellow points in the centre.

Kidneys.—Each kidney showed on the surface numerous pale areas of various sizes; these on section were seen to extend into the cortex in a wedge-shaped manner; there were no tubercles.

Suprarenal Bodies.—The right contained a minute tubercle with a calcareous grain in its centre. The left was normal.

Alimentary Tract.

Tongue, Pharynx, Palate, Tonsils.—Normal.

Retro-pharyngeal Glands.—Each contained one caseo-calcareous tubercle.

Submaxillary Glands.—The right contained one, the left two, similar tubercles.

Parotideal Glands.—Normal.

Small Intestine.—Three yellow calcareous tubercles, the largest the size of a millet seed, were found in the Peyer's patches in the small intestine; the mucous membrane over each was intact.

Large Intestine.—Normal.

Mesenteric, Ileo-colic, and Colic Glands.—These glands showed in their cortices scattered yellow caseo-calcareous tubercles up to a millet seed in size.

Testicles.—Normal.

Various Lymphatic Glands.

Precrural.—The left contained one hempseed-sized softened yellow nodule with a grey margin.

In the right there were about half a dozen similar nodules varying in size up to a hempseed.

Popliteal.—These glands showed rather numerous similar nodules.

Gluteal, Ischiatic, Mastoid.—In these glands were similar but on the whole smaller nodules.

In nearly all the nodules calcareous grains were detected.

Coeliac, Iliac, Lumbar.—These glands contained scattered yellow caseo calcareous tubercles up to a millet seed in size.

Pudic.—One gland contained a similar tubercle. Another was normal.

Sacro-iliac.—In a sacro-iliac gland there were two calcareous grains.

A haemo-lymph gland on the right side of the neck contained a yellow miliary calcareous tubercle.

Microscopical Examinations.

Pultaceous Matter from Local Lesion.—No tubercle bacilli seen.

Tubercle from Subcutaneous Tissue at Seat of Inoculation.—No tubercle bacilli seen.

Emulsion of Prescapular Gland.—Tubercle bacilli scanty.

Emulsion of Mediastinal Gland.—Tubercle bacilli scanty.

Haemo-lymph Gland from Right Prescapular Region.—No tubercle bacilli seen.

Tubercle from Small Intestine.—One tubercle bacillus seen.

Iliac Gland.—No tubercle bacilli; ? other micro-organisms.

Precrural Gland.—Tubercle bacilli scanty.

Ischiatic Gland.—Two tubercle bacilli seen.

Animals Inoculated.

One rabbit was inoculated subcutaneously with an emulsion of the mediastinal gland (No. 1290) and two with an emulsion of the prescapular gland (Nos. 1291–1292). They were killed 99 days later and found to have slight chronic tuberculosis.

Four guinea-pigs were inoculated intraperitoneally with the mediastinal gland emulsion (Nos. 2431–2434), one with an emulsion of the spleen (No. 2435), one with an emulsion of an ileo-colic gland (No. 2436), and one with an emulsion of an ischiatic gland (No. 2437). All became tuberculous.

CALF 1211. Virus H. 81. "P.W."

Subcutaneous inoculation of culture derived from the human lung.

Dose—50·0 milligrammes.

Date of Inoculation—April 12, 1907. [Age 9 weeks.]

Killed when in good health—August 14, 1907. [124 days after inoculation.]

Clinical Notes.

A tumour of moderate size developed at the seat of inoculation on the left side of the neck; this was at first firm and hard, and subsequently became soft and "doughy." On May 10 it measured 9 by 7 cm.; on June 10, 9 by 7 cm.; on August 13, 9 by 6 cm. The left prescapular gland became slightly enlarged, measuring 5 cm. in length on May 10; this slight enlargement persisted.

The calf remained in good health during the experiment.

Temperature.—Normal throughout.

Tuberculin Test.—June 10, 1907. [59 days after inoculation.] Slight reaction. Rise of temperature, 0·9° C.

Weights.—The calf was not weighed on the day of inoculation. When killed on August 14 it weighed 1 cwt. 3 qrs. 2 lbs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—At the seat of inoculation there was a tense cyst measuring 9 by 6 by 5 cm. with thick yellow caseo-purulent contents and a not very thick fibrous wall lined internally with granulation tissue, gritty from calcification; the cavity of the cyst was crossed by numerous slender fibrous trabeculae.

Left Prescapular Gland.—The left prescapular gland measured 5 by 2·5 by 1·5 cm. and showed in the cortex towards one extremity two small calcareous nodules the largest not larger than a hemp seed, and a number of calcareous grains.

Right Prescapular Gland.—Measured 5 by 2 by 1 cm., and was normal on section.

Prepectoral Glands.—One on the left side measured 1 cm. in diameter; it was very hard and fibro-calcareo-caseous throughout. The rest were normal.

Axillary Glands.—Normal.

Thorax.

Pleura.—Normal.

Lungs.—The lungs were perfectly normal in general appearance; close inspection revealed three small grey translucent tubercles just under the pleura.

Thoracic Glands.—Normal.

Heart.—Normal.

Abdomen.

Omentum and Peritoneum; Spleen.—Normal.

Liver, Portal Glands, Kidneys and Suprarenal Bodies.—Normal.

Coeliac, Renal, Lumbar, and Iliac Glands.—Normal.

Alimentary Tract.

Tongue, Pharynx, Palate, Tonsils.—Normal.

Retropharyngeal, Submaxillary, Hyoid, and Parotideal Glands.—Normal.

Intestines and Mesenteric Glands.—Normal.

Testicles.—Normal.

Various Lymphatic Glands.

Precrural, Popliteal, Gluteal, Ischiatic, and Pudic.—Normal.

CALF 1239. Virus H. 81. "P.W."

Subcutaneous inoculation of an emulsion made from the left prescapular gland of Calf 1129.

Dose—14·0 cc.

Date—May 18, 1907. [Age about 11 weeks.]

Killed when in good health—August 13, 1907. [87 days after inoculation.]

Clinical Notes.

A tumour of moderate size developed at the seat of inoculation on the left side of the neck, and the adjacent prescapular gland became considerably enlarged.

The calf remained in good health during the experiment.

Temperature.—A sharp rise (to 40·9° C.) occurred on the 21st day, but the temperature quickly fell to normal, and remained approximately normal until the calf was killed on the 87th day.

Tuberculin Test.—The calf was not tested subsequent to inoculation.

Weight.—The calf was not weighed previous to inoculation. The weight when killed was 2 cwt. 0 qr. 9 lbs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—At the seat of inoculation on the left side of the neck there was a prominent fluctuating swelling which measured 12 by 8 by 5 cm.; on section it was a cyst filled with creamy caseo-pus and solid caseous masses and crossed by numerous fibrous trabeculae; the wall was fibrous and lined internally with granulation tissue.

Left Prescapular Gland. — The left prescapular gland measured 7 by 3 by 3 cm. and was somewhat irregular and nodular in outline; on section about three-quarters of its substance was replaced by two large dense caseo-calcareous masses surrounded by fibrous tissue.

Right Prescapular Gland.—The right prescapular gland measured 5 by 2 by 1 cm. and was normal on section.

Prepectoral Glands.—On the left side one was enlarged and contained a caseo-calcareous nodule 1 cm. in diameter. The others were normal.

Axillary Glands.—Normal.

Thorax.

Pleura.—Normal.

Lungs.—On the surface of the pleura of one of the cephalic lobes there was a minute calcareous grain. There was nothing abnormal anywhere else in the lung.

Thoracic Glands.—The dorsal mediastinal and bronchial glands were normal in size and showed each a few minute calcareous grains.

Heart, Larynx, Trachea.—Normal.

Abdomen.

Omentum and Peritoneum; Spleen.—Normal.

Liver.—Just beneath the capsule on the under surface there were two spherical greyish-white homogenous fibrous looking nodules, each 2 mm. in diameter; the liver was otherwise normal.

Portal and Coeliac Glands.—Normal.

Kidneys.—Both kidneys showed on the surface scattered grey foci of a doubtful nature.

Suprarenal Bodies, Renal, Lumbar, and Iliac Glands.—Normal.

Alimentary Tract.

Tongue, Pharynx, Palate, Tonsils; Submaxillary, Pharyngeal, Hyoid, and Parotideal Glands.—Normal.

Intestines and Mesenteric Glands.—Normal.

Testicles.—Normal.

Eyes.—Normal.

Various Lymphatic Glands.

Precrural, Popliteal, Gluteal, Ischiatic, Pudic.—Normal.

Microscopical Examination.

Emulsion of Left Prescapular Gland.—Tubercle bacilli scanty.

Animals Inoculated.

Calf 1285 was inoculated subcutaneously with 20·0 cc. of the emulsion made from the prescapular gland.

Rabbits 1443 and 1444 were subcutaneously inoculated, each with 4·0 cc. of the same emulsion. They each showed local tuberculosis and slight tuberculosis of the lungs when killed 182 days later.

CALF 1285. Virus H. 81. "P.W."

Subcutaneous inoculation of an emulsion made from the left prescapular gland of Calf 1239.

Dose—20·0 cc. of emulsion, containing few tubercle bacilli.

Date of Inoculation—August 13th, 1907. [Age about 8 weeks.]

Killed when in good health—November 9th, 1907. [88 days after inoculation.]

Clinical Notes.

A slight thickening only developed at the seat of inoculation on the left side of the neck and the left prescapular gland became little if at all enlarged. The calf remained well.

Temperature

During the first four weeks following the inoculation the temperature was slightly raised, averaging about 39·2° C.; the highest temperature recorded was 40·° C., on the third day after inoculation. Subsequently it was irregular but showed no marked deviation from the normal.

Tuberculin Test.

The calf was not tested subsequent to inoculation.

Weight.

At death—1 cwt. 2 qrs. 5 lbs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—No local lesion could be felt. On deflecting the skin of the left side of the neck a small patch—about 3 cm. in diameter—of the aponeurosis of one of the muscles was very slightly thickened and contained about half-a-dozen translucent tubercles, the largest the size of a pin's head.

Left Prescapular Gland.—The left prescapular gland was perhaps a little larger than the right; no tubercles, however, were seen on section.

Right Prescapular Gland.—Measured 3·5 by 1·8 by 1· cm. and was normal on section.

Prepectoral, Axillary, and Cervical Glands.—Normal.

All the remaining glands and the organs were examined and found normal.

Microscopical Examination.

Emulsion of Left Prescapular Gland.—No tubercle bacilli.

Animals Inoculated.

Guinea-pigs 2705, 2706, and 2707 were inoculated intraperitoneally with an emulsion made from the left prescapular gland. The two former died prematurely in nine and twelve days and showed slight tuberculosis of the omentum only, the latter was killed after 23 days and showed early general tuberculosis.

CALF 1323. Virus H. 81. "P.W."

Intravenous inoculation of an emulsion made from the omentum, the spleen, the sternal glands, and many of the abdominal lymphatic glands of each of three guinea-pigs, 2818–2819–2820. These guinea-pigs were the second series from Calf 1285.

Dose—20·0 cc. The emulsion contained numerous tubercle bacilli.

Date of Inoculation—January 3, 1908. [Age about 5 months.]

Died—January 20, 1908. [17 days after inoculation.]

Clinical Notes.

The calf was first noticed to be ill on January 19, 16 days after inoculation; it was lying on the ground with head extended, breathing rapidly; the following morning it was dead.

Temperature.

On the 11th day after inoculation the temperature rose to 39·6° C. The next day it was subnormal, 38·4° C. 40·5, 41·3, and 40·5° C. respectively were recorded on the three following days; on the morning of the fourth day the calf was dead.

Tuberculin Test.

The calf was not tested subsequent to inoculation.

Weight.

At death—1 cwt. 3 qrs. 17 lbs.

POST-MORTEM EXAMINATION.

The carcass was in moderately good condition.

Thorax.

Each pleural cavity contained about 20·0 cc. of clear yellow fluid.

Pleura.—There were no tubercles on the pleura.

Lungs.—The lungs weighed 8 lbs. 2 ozs. The anterior lobes and practically the whole of the posterior were red, solid, and airless; in the caudal lobes there were several large emphysematous patches (interstitial); no definite tubercles were seen on the surface, but on section the lung substance was seen to be peppered with minute grey foci.

The tissues around the pericardium and in the dorsal mediastinum were emphysematous.

Heart.—The surface of the heart showed large ecchymotic patches. The cavities of both sides of the heart were full of red blood-clot, which extended into the great vessels. The endocardium of the right auricle and ventricle showed fairly numerous greyish-white tubercles, the largest nearly 1 mm. in diameter; there were a few similar tubercles on the endothelium of the superior vena cava. There were two or three minute tubercles under the endocardium of the left auricle and ventricle.

Thoracic Glands.—The bronchial and mediastinal glands were enlarged (about twice the normal) and the majority were congested. The left bronchial gland was soft and diffluent; the others were firmer.

There was no naked-eye evidence of tuberculosis in any of the glands, but the cortical portions were greyer and more opaque than normal.

Larynx and Trachea.—Normal.

Abdomen.

Omentum and Peritoneum.—On the ventral surface of the omentum there were two congested grey tubercles. The peritoneum was normal.

Spleen.—The spleen weighed 13 ozs.; it was flabby and its pulp was soft; no tubercles were seen in it.

Liver.—The liver substance was a little paler and more friable than normal. In certain limited areas grey miliary tubercles were seen on the surface under the capsule; on section a few doubtful grey foci were seen.

Portal Glands.—The portal glands were oedematous; there were no macroscopic lesions.

Gall-Bladder.—The gall-bladder was full of dark-coloured bile; there were no tubercles in the mucous membrane.

Kidneys.—A few minute grey foci were seen on the surface of each; on section one grey tubercle was seen in the cortex of the left, none in the right.

Suprarenal Bodies.—Normal.

Renal, Lumbar and Iliac Glands.—Normal.

Alimentary Tract.

Tongue, Pharynx, Palate, Tonsils; Submaxillary, Retro-pharyngeal, and Parotideal Glands.—Normal.

Intestines.—The mucous membrane of the intestines showed patches of congestion, otherwise they were normal.

Mesenteric Glands.—Some of the glands were emphysematous, otherwise they were normal.

Various Lymphatic Glands.

Prescapular Glands.—The gland on each side was deeply hæmorrhagic, almost black in colour.

Prepectoral Glands.—Congested, otherwise normal. Many of the other peripheral lymphatic glands were congested, but in none were any definite tubercles seen.

Mammary Glands.—The mammary gland tissue was deeply congested. The tissues around the udder were oedematous.

Microscopical Examination.

Emulsion of the Posterior Mediastinal Gland.—Tubercle bacilli moderately numerous.

Smear from the Lung.—A few tubercle bacilli seen.

Smear from the Bronchial Gland.—A few tubercle bacilli seen.

Smear from the Spleen.—A few tubercle bacilli seen.

Smear from the Liver.—No tubercle bacilli seen.

Animals Inoculated.

Calf 1313 was inoculated intravenously with 10·0 cc. of an emulsion made from the posterior mediastinal gland.

Rabbits 1690 and 1691 were inoculated subcutaneously each with 3·0 cc. of the same emulsion. The former died in 215 days and showed a local lesion and tuberculosis of the lungs and mammary gland; the latter was killed after 249 days and showed a local lesion and slight tuberculosis of the lungs.

CALF 1313. Virus H. 81. "P.W."

Intravenous inoculation of an emulsion made from the posterior mediastinal gland of Calf 1323.

Dose—10·0 cc. of emulsion (5·0 cc. in the ear vein and 5·0 cc. in the jugular vein). Tubercle bacilli were moderately numerous.

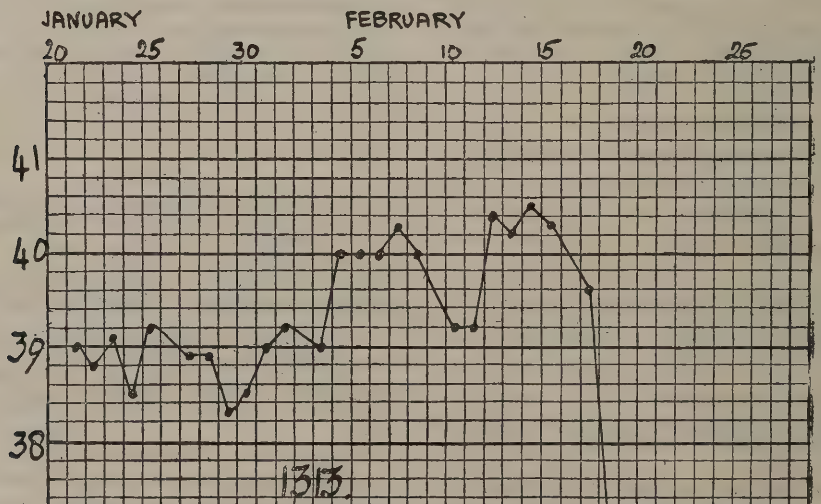
Date of Inoculation—January 20, 1908. [Age about 11 weeks.]

Killed when dying—February 18, 1908. [29 days after inoculation.]

Clinical Notes.

The calf was noticed to be unwell on the third day after inoculation. From that day onward it took very little food and daily became thinner. On February 15, the breathing was quickened; the calf then rapidly grew worse and was killed when dying on February 18.

Temperature.



Tuberculin Test.—The calf was not tested subsequent to inoculation.

Weight.

At death—3 qrs. 23 lbs.

POST-MORTEM EXAMINATION.

The carcass was thin.

Thorax.

Heart.—The heart was flabby. Scattered minute greyish-white tubercles were seen on the endocardium of the right auricle and right ventricle; there were some on the endocardium of the left side of the heart.

Lungs.—The lungs weighed 4 lbs. 2 ozs. The lobes on the right side were firm, heavy, and, with the exception of a small lobule here and there, solid and airless; the left lung was slightly congested and crepitant throughout; no tubercles were seen from the surface (on drying, the surfaces of the lung by reflected light had a finely granular appearance); the parenchyma of the right lung was reddish and airless, and showed on close inspection numberless minute greyish points, producing a finely-peppered appearance. On section of the left lung close inspection showed the substance closely beset with minute glassy foci; the cut surface was finely granular. There was muco-pus in the right bronchi.

Thoracic Glands.—The bronchial and mediastinal glands were enlarged to about twice the normal size; on section the cortices were firmer and greyer than normal, and showed here and there opaque whitish or yellowish-white foci which in some of the glands formed an irregular network; the medullary parts of the glands were congested and oedematous.

Pleura.—Normal.

Abdomen.

Omentum and Peritoneum.—Normal.

Spleen (8 ozs.).—Normal.

Liver.—The liver was yellowish and appeared enlarged; it showed on the convex surface under the capsule fairly numerous pale grey tubercles just visible to the eye; on the concave surface only an occasional focus was seen; on section minute grey tubercles could just be discerned distributed throughout the substance.

Portal Glands.—The portal glands were oedematous, not enlarged, and showed a few doubtful greyish-white points.

Coeliac Glands.—One or two doubtful points were seen in one gland.

Kidneys.—A grey miliary focus was seen in the cortex of one kidney, and one or two minute grey points in that of the other.

Suprarenal Bodies.—Normal.

Renal, Lumbar, and Iliac Glands.—Normal.

Alimentary Tract.

Tongue, Pharynx, Tonsils; Submaxillary, Retropharyngeal, and Parotideal Glands, Intestines, Mesenteric and Ileo-Colic Glands.—Normal.

No tubercles were seen in any of the peripheral lymphatic glands.

Microscopical Examination.

Smears from:

Liver (*Emulsion*).—Tubercle bacilli numerous.

Spleen.—Tubercle bacilli numerous.

Lungs.—Tubercle bacilli less numerous than in the liver and spleen.

Gluteal Gland.—Tubercle bacilli numerous.

Mediastinal Gland.—Tubercle bacilli numerous.

Portal Gland.—Tubercle bacilli numerous.

In most of the preparations there were many long curved and beaded forms, and a good many small clumps.

Animals Inoculated.

Calf 1359 was inoculated intravenously with 10·0 cc. of an emulsion made from the liver.

Rabbits 1733 and 1734 were inoculated subcutaneously each with 2·5 cc. of the same emulsion. They were killed after 242 and 367 days respectively and showed slight tuberculosis.

CALF 1359. Virus H. 81. "P.W."

Intravenous inoculation of an emulsion made from the liver of Calf 1313.

Dose—10·0 cc. [The emulsion contained numerous tubercle bacilli.]

Date of inoculation—February 18, 1908. [Age about 10 weeks.]

Died—April 6, 1908. [48 days after inoculation.]

Clinical Notes.

The calf was noticed to be unwell within a week after inoculation. It lost its appetite and became weak and thin, and the respiration was quickened. The calf gradually grew worse; on April 4, it was found lying down with head stretched out and unable to rise; on April 5 it was standing up and seemed better, but on the following morning it was found dead.

Temperature.

During the first eleven days the temperature was irregular (maximum 39·6° C., minimum 37·8° C.). On the 12th day it rose to 40·0° C., and reached 40·9° C. on the 17th day. The temperature then slowly fell, and during the last twelve days of life was approximately normal.

Weight.

At death—3 qrs. 1 lb.

POST-MORTEM EXAMINATION.

The carcass was thin.

Local Lesion.—On the left side of the neck, in close contact with the jugular vein, extending from the middle of the neck to the first rib, there was an elongated tumour about 18 cm. in length and 3 cm. in greatest breadth; it was composed of dense yellow irregular caseous areas or tracts surrounded and separated by firm reddish grey or fibroid muscular tissue. The wall of the vessel was not infiltrated, and there was only a small yellow focus at one point to mark the site of entry of the injection needle.

Prepectoral Glands.—On the left side, one the size of a pea was composed of greyish red tissue infiltrated with a caseous network; another small one showed a few caseous foci. The glands on the right side were normal.

Cervical Glands.—Several of the cervical glands on the left side were enlarged oedematous and with one or two exceptions showed small groups of early caseous foci in the cortices. Other cervical glands were normal.

Prescapular Glands.—Normal.

Thorax.

Heart.—The endocardium of the right ventricle and right auricle showed numerous flat grey tubercles the largest rather more than 1 mm. in diameter, and the majority with minute opaque centres. The left side of the heart was normal.

Lungs.—The anterior lobes of the lung were extensively though not completely hepatised, being firm and dark red; the caudal lobes showed the antero-ventral parts hepatised, and scattered isolated consolidated lobules elsewhere; pieces from these sank in water. From the surface no tubercles were seen, but in the crepitant lobules there was distinct thickening of the connective tissue between the lobules. On section close inspection showed in many of the lobules numerous minute transparent grey points; in some of the lobules they looked like definite tubercles, but in the majority they were very indefinite and in many could not be detected.

Thoracic Glands.—The bronchial and mediastinal glands were enlarged and very oedematous; the cortices were perhaps a little greyer and firmer than normal but there was no sign of caseation.

Heart.—Normal.

Abdomen.

Omentum and Peritoneum.—Normal.

Liver.—On the anterior surface fairly numerous minute greyish foci were seen; a few of these were definitely in the substance but the majority appeared to be on or in the capsule; the posterior surface was normal. On section here and there a doubtful grey point was seen.

Portal Glands.—The portal glands were very oedematous but were not otherwise abnormal.

Spleen.—The spleen was normal in size and nothing abnormal was seen on section.

Kidneys.—On the surface of each kidney scattered minute grey foci of a doubtful nature were seen.

Suprarenal Bodies, Renal, Lumbar, and Iliac Glands.—Normal.

Alimentary Tract.

Tongue, Palate, Pharynx, Tonsils, Retro-pharyngeal, Submaxillary and Parotideal Glands.—Normal.

Intestines.—Under the mucous membrane of the small intestine throughout its whole length there were extremely numerous grey foci which in places gave the gut a distinctly granular feel when passed twixt finger and thumb. The large intestine was normal.

Mesenteric Glands.—The mesenteric glands were oedematous, no tubercles were seen in them.

Various Lymphatic Glands.

Precrural, Popliteal, Gluteal, Ischiatic, Pudic.—Normal.

Microscopical Examinations.

Emulsion of Local Lesion. — Tubercle bacilli numerous.

Emulsion of Left Bronchial Gland.—Tubercle bacilli moderately numerous.

General scraping from solid portion of Lung.—Tubercle bacilli not numerous.

General scrapings from Liver, Spleen, and Kidney.—No tubercle bacilli seen in any of them.

General scraping from Suprarenal Body.—A few tubercle bacilli seen.

Grey Foci from Small Intestine.—A moderate number of tubercle bacilli.

Scrapings from Gluteal Gland and from Parotideal Gland.—No tubercle bacilli seen in either.

Animal Inoculated.

Calf 1399 was subcutaneously inoculated with 14·0 cc. of an emulsion made from the left bronchial gland.

CALF 1399. Virus H. 81. "P.W."

Subcutaneous inoculation of an emulsion made from the left bronchial gland of Calf 1359.

Dose—14·0 cc. of the emulsion, in which tubercle bacilli were moderately numerous.

Date of Inoculation—April 6, 1908. [Age about 15 weeks.]

Killed when in good health—August 4, 1908. [120 days after inoculation.]

Clinical Notes.

The calf remained well during the experiment, except for some slight constitutional disturbance during the period of high temperature. The weight of the animal when killed was 1 cwt. 3 qrs. 8 lbs.; it had grown well since the inoculation.

Temperature.

On the 10th day after inoculation the temperature rose to 39·8° C. and it reached 40·8° C. on the 25th day; on the 31st day it fell suddenly to the normal. There was a secondary rise ten days later lasting four days (maximum 39·7° C.); after this the temperature remained normal.

POST-MORTEM EXAMINATION.

The carcass was fat.

Local Lesion.—At the seat of inoculation on the left side of the neck there was a circumscribed tumour measuring 8 by 5 by 3 cm.; on section it was composed of gritty caseo-purulent substance surrounded by a thick fibrous wall and crossed by fibrous trabeculae.

Left Prescapular Gland.—The left prescapular gland was a little larger than the right; it showed in the cortex a calcareous nodule about 2·5 mm. in diameter and a few calcareous grains.

Right Prescapular Gland.—The right prescapular gland measured 5 by 2 by 1 cm. and was normal on section.

Prepectoral, Axillary and Cervical Glands.—Normal.

Thorax.

Pleura.—Normal.

Lungs.—The lungs were perfectly normal in general appearance; close inspection showed under the pleura scattered transparent grey bodies of a doubtful nature. The lungs were normal on section.

Thoracic Glands and Heart.—Normal.

Abdomen.

Omentum and Peritoneum; Spleen, Liver, Kidneys and Suprarenal Bodies; Portal, Renal, Lumbar and Iliac Glands.—Normal.

Alimentary Tract.

Tongue, Pharynx, Tonsils; Submaxillary Retro-pharyngeal and Parotideal Glands; Intestines.—Normal.

Mesenteric Glands.—One mesenteric gland showed in the cortex two or three yellow calcareous foci; the rest were normal.

Ileo-colic Glands—One ileo-colic gland contained a group of three calcareous foci.

Testicles.—Normal.

Various Lymphatic Glands.

Precrural, Popliteal Gluteal, Ischiatic, Pudic.—Normal.

Microscopical Examination.

Emulsion of Left Prescapular Gland.—A few tubercle bacilli.

Animals Inoculated.

Guinea-pigs 3201 and 3202 were inoculated intraperitoneally with an emulsion made from the left prescapular gland.

They were killed after 41 days and showed early general tuberculosis.

CALF 1499. Virus H. 81. "P.W."

Subcutaneous inoculation of culture derived from the prescapular gland of Calf 1399.

Dose—200·0 milligrammes.

Date of Inoculation—October 13, 1908. [Age about 5 months.]

Killed when in good health—February 2, 1909. [112 days after inoculation.]

Clinical Notes.

The calf remained well during the experiment and grew normally.

Temperature.

There was a period of slight pyrexia commencing on the 4th day after inoculation and lasting eight days (maximum 40·1° C.); with this exception the temperature was normal during the experiment.

Tuberculin Test.

January 7, 1909. [86 days after inoculation.] Dose, 2·0 cc. Reacted. Rise of temperature, 1·5° C.

Weights.

	cwt.	qrs.	lbs.
October 13, 1908	1	3	13
February 2, 1909... ...	2	2	16

Total gain in weight.—3 qrs. 3 lbs.

Average rate of gain per week.—5·4 lbs.

POST-MORTEM EXAMINATION.

The carcass was fat.

Local Lesion.—At the seat of inoculation on the left side of the neck there was a fluctuating tumour measuring 8 by 6 by 3·5 cm.; on section there was in the subcutaneous tissues an oval mass 4 cm. in length of caseo-purulent substance surrounded by fibrous tissue; the skin over it was greatly thickened and was pierced by a narrow sinus which communicated with the cavity containing the caseo-pus.

Left Prescapular Gland.—The left prescapular gland measured 6·4 by 3·5 by 2 cm. and showed on longitudinal section two calcareous patches, one 3 by 2 cm., the other much smaller, composed of calcareous nodules set in congested and rather dense glandular tissue; there were besides a few small isolated calcareous nodules in the cortex.

The *Right Prescapular Gland* measured 5 by 2·3 by 1·2 cm. and was normal on section.

Cervical Glands.—One on the left side in the lower part of the neck was slightly enlarged and part of the cortex was firmer than normal congested and contained a number of discrete miliary calcareo-caseous tubercles. The rest of the cervical glands were normal.

There was no tuberculosis elsewhere in the body.

Microscopical Examination.

Emulsion of Cervical Gland.—A few tubercle bacilli.

CALF 1215. Virus H. 81. "P.W."

Subcutaneous inoculation of emulsion of tissues from Guinea-pigs 2431–2434 (infected from the mediastinal gland of Calf 1145).

Date of Inoculation—June 11, 1907. [Age about 17 weeks.]

Dose—Rather less than 10·0 cc. of the emulsion, in which tubercle bacilli were not very numerous.

Killed when in good health—August 14, 1907. [64 days after inoculation.]

Clinical Notes.

A small tumour developed at the seat of inoculation on the left side of the neck, and the adjacent prescapular gland became slightly enlarged. The calf remained well during the experiment.

Temperature.

During the first month after inoculation the temperature of the calf was somewhat irregular; a maximum of 40·0° C. was reached on the 21st day. The mean temperature during this period was 39·1° C. Subsequently the temperature was normal.

Tuberculin Test.

The calf was not tested subsequent to inoculation.

Weights.

The calf was not weighed on the date of inoculation; when killed the weight of the animal was 1 cwt. 3 qrs. 14 lbs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—In the subcutaneous tissues on the left side of the neck there was a flat firm somewhat nodular tumour measuring 7 by 5 by 1 cm. composed of dense irregular yellow caseous tracts and nodules, slightly gritty from calcification, separated and surrounded by fibrous tissue.

Left Prescapular Gland.—The left prescapular gland was only slightly larger than the right and showed in the cortex a few small groups of yellow gritty foci.

Right Prescapular Gland.—(5 by 2·3 by 1 cm.). Normal on section.

Prepectoral Glands.—On the left side one, nearly 1 cm. in diameter, showed the greater part of the cortex caseous and slightly gritty from calcification. Other prepectoral glands were normal.

Axillary Glands.—Normal.

Thorax.

Pleura.—Normal.

Lungs.—The lungs were perfectly normal to the naked eye.

Thoracic Glands.—The dorsal mediastinal and bronchial glands contained sparsely scattered yellow gritty foci.

Heart.—Normal.

Abdomen.

Omentum and Peritoneum, Spleen.—Normal.

Liver.—The liver showed under the capsule some sparsely scattered minute grey foci; a few grey points were seen on section.

Portal Glands.—In the cortex of one a minute yellow point, not gritty, was seen.

Kidneys.—There were numerous pale spots on the surface which extended into the cortex as fine streaks, but no definite tubercles.

Suprarenal Bodies.—Normal.

Coeliac Glands.—One coeliac gland contained a yellow focus, not gritty.

Renal, Lumbar, and Iliac Glands.—Normal.

Alimentary Tract.

Tongue, Pharynx, Palate, Tonsils; Retro-pharyngeal, Submaxillary, Hyoid, and Parotideal Glands.—Normal.

Intestines.—Normal.

Mesenteric Glands.—A minute yellow gritty focus was found in the cortex of one mesenteric gland.

Testicles.—Normal.

Eyes.—Normal.

Various Lymphatic Glands.

Precrural.—The right precrural showed in the cortex a minute yellow point not perceptibly gritty. The left was normal.

Popliteal, Gluteal, Ischiatic, Pudic.—Normal.

Microscopical Examination.

Emulsion of Prescapular Gland.—No tubercle bacilli seen.

Smear from Prepectoral Gland.—A few tubercle bacilli seen.

Focus from Precrural Gland.—No tubercle bacilli seen.

Focus from Liver.—No tubercle bacilli seen.

Animals Inoculated.

Three guinea-pigs, Nos. 2563, 2564, 2565, were intraperitoneally inoculated with an emulsion made from the left prescapular gland. All became tuberculous.

CALF 1307. Virus H. 81. "P.W."

Subcutaneous inoculation of an emulsion made from various tissues of Guinea-pigs 2563 and 2564 inoculated with the prescapular gland of Calf 1215.

Dose—20·0 cc. of the emulsion, which contained fairly numerous tubercle bacilli.

Date of Inoculation—September 11, 1907. [Age about 11 weeks.]

Killed when in good health—January 8, 1908. [119 days after inoculation.]

Clinical Notes.

A small flat swelling, pear-shaped in outline, developed at the seat of inoculation on the left side of the neck. Twelve days after inoculation it measured 9 cm. in length. The left prescapular gland was at this time slightly enlarged, measuring 8 cm. in length.

The tumour afterwards became soft and fluctuating, then opened and discharged its caseo-purulent contents; finally the discharge ceased and the opening healed, leaving a small firm tumour with a scar in the skin over it.

The calf remained well during the experiment.

Temperature.

There was a period of irregular pyrexia commencing on the 10th day after inoculation, and lasting 20 days (maximum 40·2° C., minimum 38·7° C.). Subsequently the temperature was approximately normal.

Tuberculin Test.

The calf was not tested subsequent to inoculation.

Weight.

At death—1 cwt. 3 qrs. 2 lbs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—In the subcutaneous tissues on the left side of the neck there was a mass of fibrous tissue measuring 5 by 3·5 by 1·5 cm., with a patch of yellow calcareous foci in the centre; the skin over the mass was thickened and showed a depressed scar.

Left Prescapular Gland.—The left prescapular gland was about half as large again as the right; about a quarter of the cortex, at the middle of the convex surface, was fibro-calcareous.

Right Prescapular Gland.—The right prescapular gland measured 5·2 by 2 by 1 cm. and was normal on section.

Prepectoral and Axillary Glands.—Normal.

All the organs and the rest of the lymphatic glands were examined and found normal.

Microscopical Examination.

Emulsion of Left Prescapular Gland.—A few tubercle bacilli seen.

Animals Inoculated.

Two guinea-pigs, Nos. 2871 and 2872, were inoculated intraperitoneally with an emulsion made from the bronchial gland (killed after 29 days, healthy), and three, Nos. 2873, 2874, 2875, intraperitoneally with an emulsion made from the left prescapular gland (killed after 29 days, early general tuberculosis).

CALF 1357. Virus H. 81. "P.W."

Subcutaneous inoculation of an emulsion made from the tuberculous tissues of Guinea-pigs 2873, 2874, and 2875 (inoculated with the prescapular gland of Calf 1307.

Dose—20·0 cc. of the emulsion, which contained fairly numerous tubercle bacilli.

Date of Inoculation—February 6, 1908. [Age about 15 weeks.]

Killed when in good health—July 31, 1908. [176 days after inoculation.]

Clinical Notes.

The calf remained well and grew normally during the experiment; its weight when killed was 2 cwt. 1 qr. 8 lbs.

Temperature.

There was a slight rise of temperature commencing on the 8th day after inoculation and lasting 12 days; the maximum recorded during this period was 40·2° C. Subsequently the temperature was normal.

POST-MORTEM EXAMINATION.

The carcass was fat.

Local Lesion.—At the seat of inoculation on the left side of the neck there was a slightly raised thickened patch with ill-defined margins; on section this consisted of thickened skin, and a small brownish fibroid patch 3 cm. in diameter and 5 cm. thick, beset with calcareous foci and a few caseo-calcareous nodules up to a hempseed in size.

Left Prescapular Gland.—The left prescapular gland appeared slightly enlarged (5 by 2·8 by 1·5 cm.); it contained two calcareous nodules, one the size of a French bean (1 cm. in length), the other that of a pea.

Right Prescapular Gland.—The right prescapular gland was enlarged, measuring 6 by 3 by 1·5 cm.; on section it was oedematous and slightly congested (recent tuberculin test).

Prepectoral, Cervical, and Axillary Glands.—Normal.

Thorax.

Lungs.—The lungs were normal in general appearance. Close inspection showed sparsely scattered translucent grey bodies, the largest about 1 mm. in diameter; they were homogeneous and none had a calcareous centre.

All the other glands and organs were examined and found normal.

Microscopical Examination.

Emulsion of Nodule from Prescapular Gland.—No tubercle bacilli seen.

Animals Inoculated.

Guinea-pigs 3191 and 3192 were inoculated intraperitoneally with an emulsion made from the left prescapular gland. They were killed after 45 days and showed general tuberculosis.

CALF 1469. Virus H. 81. "P.W."

Subcutaneous inoculation of culture derived from the prescapular gland of Calf 1357.

Dose—100·0 milligrammes.

Date of Inoculation—October 5, 1908. [Age about 6 months.]

Killed when in good health—January 18, 1909. [105 days after inoculation.]

Clinical Notes.

A large firm swelling quickly developed at the seat of inoculation on the left side of the neck; on October 19th it measured 14 by 12 cm. It subsequently became prominent, soft and fluctuating, then opened and discharged caseo-pus. The collapsed abscess diminished in size and the ulcer healed up, the tumour being finally represented by a patch of thickening in the skin.

The left prescapular gland became considerably enlarged and remained so during the experiment.

The health of the calf was good during the experiment.

Temperature.

The temperature was slightly raised and irregular for a period of ten days commencing on the 9th day after inoculation (maximum 40·3° C.). Subsequently the temperature was normal.

Tuberculin Test.

January 7, 1909. [94 days after inoculation.] Dose, 2·0 cc. Reacted. Rise of temperature, 1·3° C.

Weights.

	cwt.	qrs.	lbs.
October 5, 1908	2	0	2
January 18, 1909	2	2	11

Total gain of weight.—2 qrs. 9 lbs.

Average rate of gain per week.—4·3 lbs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—The lesion at the seat of inoculation on the left side of the neck consisted of a patch of thickened skin with ill-defined margins about 12 cm. in greatest diameter and 2 cm. in greatest thickness; on the surface there was a puckered well-healed scar.

Left Prescapular Gland.—The left prescapular gland measured 8 by 5 by 4·5 cm. and consisted almost entirely of three softened caseous masses with thick fibrous walls, the largest about half the size of the gland; calcareous grains could be detected in the caseo-pus.

Right Prescapular Gland.—The right prescapular gland measured 4·7 by 2·2 by 1·2 cm. and was normal on section.

All the organs and the remaining glands were examined and found free from tuberculosis.

Microscopical Examination.

Emulsion of Left Prescapular Gland.—A few tubercle bacilli.

CALF 1223. Virus H. 81. "P.W."

Intravenous inoculation of an emulsion made from the tuberculous lesions (omenta, sternal glands, some of the abdominal glands, and one spleen) of four guinea-pigs (2431–2434) injected with the mediastinal gland of Calf 1145.

Dose—Rather less than 10·0 cc. of the emulsion; tubercle bacilli were not very numerous.

Date of Inoculation—June 11, 1907. [Age about 17 weeks.]

Killed when in good health—November 13, 1907. [155 days after inoculation.]

Clinical Notes.

About a week after inoculation the calf became very ill; the respirations were increased and the calf lost appetite and weight; it continued unwell for a week or two and then gradually began to recover; early in the third month after inoculation it was perfectly healthy-looking, had put on flesh and was eating well. It remained well during the following two months, and was then killed.

Temperature.

On the 16th day after inoculation the temperature rose to 40·1° C. and reached a maximum of 41·2° C. on the 21st day. It then slowly returned to the normal, and remained normal subsequently. The duration of the period of high temperature was 15 days.

Tuberculin Test.

The calf was not tested subsequent to inoculation.

Weight.

At death.—2 cwt. 2 qrs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Thorax.

Lungs.—The lungs were normal in general appearance; they showed under the pleura a number of grey specks ranging in size from a point just visible to the naked eye up to that of a grain of sand. On section pearly or glassy tubercles the largest about 0·5 mm. in diameter were sparsely distributed throughout the parenchyma (from one to two were seen on the cut surface of each lobule); in some of these extremely minute calcareous grains were detected; the very minute grey points seen on the surface were not discernible on section.

Thoracic Glands.—The bronchial and mediastinal glands were not enlarged. The bronchial glands on section showed calcareous patches and foci situated rather deeply in the cortex and separated from the capsule by a layer of normal gland tissue. In the dorsal mediastinal glands there were similar patches and foci, but not so numerous, the long mediastinal gland being least affected.

Heart.—In the muscle just under the endocardium of the right auricle four minute yellow calcareous foci were seen

Larynx and Trachea.—Normal.

Abdomen.

Omentum and Peritoneum, Spleen and Liver.—Normal.

Portal Glands.—In one gland a minute calcareous grain was found.

Kidneys.—On the surface of each kidney fairly numerous grey areas of various sizes were seen; these on section were found to extend into the cortex as grey streaks or wedges. There were no definite tubercles.

Suprarenal bodies.—Normal.

Alimentary Tract.

Tongue, Pharynx, Tonsils; Intestines; Mesenteric and Ileo-colic Glands.—Normal.

Testicles.—Normal.

Various Lymphatic Glands.

The Precrural, Popliteal, Lumbar, Iliac, Coeliac, Parotideal, Submaxillary, Retro-pharyngeal, Cervical, Prescapular, Prepectoral and Axillary Glands were normal.

Gluteal.—In the cortex of one gluteal gland there was a minute calcareous tubercle.

Pudic.—One pudic gland contained a pinhead-sized calcareous tubercle.

Ischiatic.—An ischiatic gland contained two pinhead-sized calcareous tubercles.

Microscopical Examination.

Smear from Ischiatic Gland.—Tubercle bacilli scanty.

Emulsion of a portion of the Lung.—No tubercle bacilli seen.

Emulsion of the Left Bronchial and a Mediastinal Gland.—Tubercle bacilli scanty.

Guinea-pigs Inoculated.

Three guinea-pigs, Nos. 2715, 2716, and 2717, were inoculated intraperitoneally with an emulsion made from the left bronchial and a mediastinal gland. Two died prematurely in seven and eight days and showed no macroscopic evidence of tuberculosis; the third was killed after 28 days and showed early general tuberculosis.

Two guinea-pigs, Nos. 2718 and 2719, were inoculated with an emulsion of the lung. One died prematurely in eight days and showed no macroscopic evidence of tuberculosis, the other was killed after 72 days and showed general tuberculosis, not very severe.

One guinea-pig, No. 2720, was inoculated with an emulsion of the spleen. It was free from tuberculosis when killed 72 days later.

CALF 1335. Virus H. 81. "P.W."

Subcutaneous inoculation of an emulsion made from the tuberculous tissues of Guinea-pigs 2845 and 2846, the second series from Calf 1223.

Dose—20·0 cc. of emulsion containing tubercle bacilli in moderate numbers.

Date of Inoculation—January 7, 1908. [Age about 14 weeks.]

Killed when in good health—July 22, 1908. [197 days after inoculation.]

Clinical Notes.

The calf remained well during the experiment.

Temperature.

During the first ten weeks of the experiment the temperature was very irregular, the range of variation being 2·6° C. (37·4–40·0° C.). The irregularity of temperature gradually diminished in range, and during the last two months of the experiment the temperature was normal.

Tuberculin Test.

The calf was not tested subsequent to inoculation.

Weight.

At death—1 cwt. 3 qrs. 14 lbs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—At the seat of inoculation on the left side of the neck there was a small hemispherical tumour measuring 2 by 1 by 1 cm. composed of caseopus and a fibrous wall lined with granulation tissue; in the subcutaneous tissues immediately around the tumour there were some small groups of calcareous tubercles.

Left Prescapular Gland.—The left prescapular gland was normal in size; there was no sign of tuberculosis on section.

Right Prescapular Gland, Prepectoral and Axillary Glands.—Normal.

Thorax.

Lungs.—The lungs were pink and crepitant; they showed under the pleura scattered translucent grey tubercles ranging up to 1 mm. in diameter; none of the tubercles was calcareous.

All the other organs and glands were examined and found normal.

Microscopical Examination.

Emulsion of Local Lesion.—Tubercle bacilli moderately numerous.

Smear from four Tubercles from the Lung.—No tubercle bacilli.

Animals Inoculated.

Guinea-pigs 3161 and 3162 were inoculated intraperitoneally with an emulsion of the left prescapular gland (killed after 54 days; slight general tuberculosis).

Guinea-pig 3163 was inoculated intraperitoneally with an emulsion of lung containing one tubercle (killed after 49 days; healthy).

Guinea-pig 3164 was inoculated intraperitoneally with an emulsion of left bronchial gland (killed after 49 days; healthy).

CHIMPANZEE 7. Virus H. 81. "P.W."

(A young animal, not fully grown; about 4 years old.)

Subcutaneous inoculation of culture derived from the human lung.

Dose—0·00001 milligramme.

Date of Inoculation—May 29, 1907.

Died—August 29, 1907. [92 days after inoculation.]

Clinical Notes.

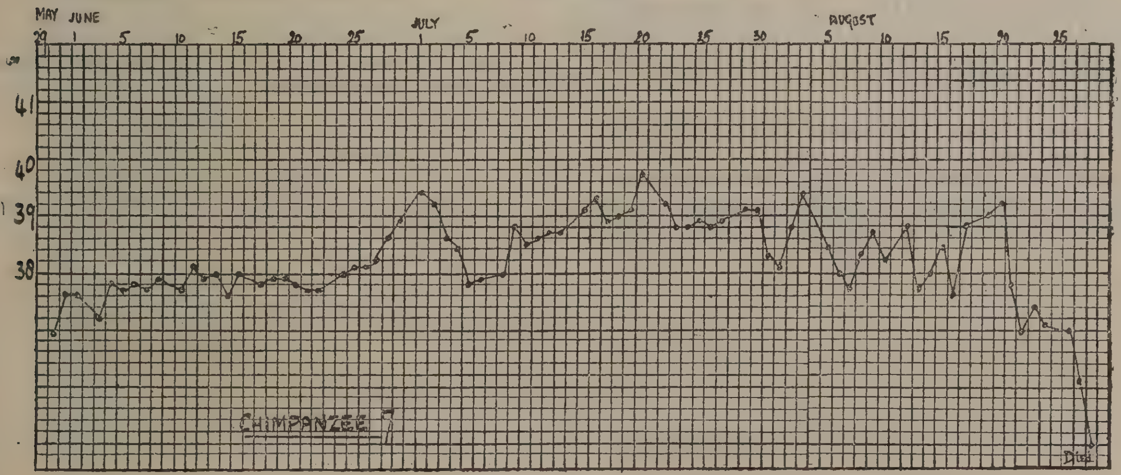
A month after the inoculation (June 27) there was a somewhat indefinite local thickening about an inch in diameter over the right scapula, and a gland in the right axilla was distinctly enlarged. There was no change in the general health.

Two months after the inoculation (July 24) a mass of enlarged glands was noticed in the right axilla, the skin over which was reddened thinned and at one place ulcerated; the mass increased in size, enlarged glands being felt just under the posterior margin of the axilla.

For several weeks subsequently the animal was obviously ill, and had a very poor appetite. During the early part of August he became very anaemic and appeared thinner and weaker; on August 22 well marked oedema of the eyelids was noticed.

Six days later the animal was found lying down in a corner of his cage; he refused to move, and took no food. The following day, August 29, he died.

Temperature.



Weight.

At death—15 lbs.

POST-MORTEM EXAMINATION.

Carcass.—In fair condition.

Local Lesion.—At the seat of inoculation over the right scapula there was a somewhat flattened tumour about 2 cm. in diameter, the skin over which was thinned, a little discolored, but not ulcerated.

It contained on section soft caseous substance.

In the subcutaneous tissue anterior to it there was a second small caseous nodule.

Axillary Glands.—In the right axilla there was a prominent mass of adherent glands measuring 8 by 4·5 by 2·5 cm. In the overlying skin there was a circular ulcer about 2 cm. in diameter. The margins were thin, undermined, and sloughing; the base of the ulcer was formed by the underlying necrotic mass. On section the mass consisted almost entirely of softening yellow caseous substance divided up by fibrous trabeculae.

The glands in the left axilla were normal.

Vertebral Glands.—One right vertebral gland was caseous.

Thorax.

Pleura (see under "Lungs").

Lungs.—The left lung was collapsed and adherent to the chest wall. The adhesions could be separated fairly easily. On the right side the lung was firmly adherent to the chest wall, the pericardium, and the diaphragm, from which it could only be separated by dissection. The adhesions were fibrous and in them could be seen caseous foci.

The left lung was very oedematous and congested, but still floated in water. On section an occasional caseous nodule the size of a millet seed was found.

The right lung on section was deeply congested and firm; small portions sank in water, others just floated. It showed caseous nodules up to a hemp seed, sparsely scattered, but rather more numerous than in the right.

Thoracic Glands.—A bronchial gland on the right side anterior to the bronchus, 1·5 cm. in diameter, was caseous throughout and partially softened.

The other bronchial glands were very little enlarged and contained irregular caseous nodules.

One ventral mediastinal gland was enlarged, containing discrete caseous tubercles; a smaller gland contained a single hemp seed sized nodule. The remaining glands and those on the left side were normal.

Heart, Larynx and Trachea.—Normal.

Abdomen.

There was some excess of fluid in the peritoneal cavity and the retroperitoneal tissues were oedematous.

Peritoneum.—On the parietal peritoneum in contact with the liver there was an area showing a few flattened translucent tubercles, and a few scattered ones up to a millimetre in diameter were seen on the rest of the peritoneum.

On the peritoneal surface of the diaphragm, mainly on the central tendon, there were numerous flattened translucent nodules with central caseous foci and patches arranged radially.

Omentum.—The omentum was not thickened. It contained from 30 to 40 grey nodules, varying from a point up to a hemp seed in size; the largest were caseous in the centre.

Spleen.—The spleen was enlarged, measuring 12 cm. by 7 cm. in greatest width, by 2·1 cm. in thickness. On the surface there were a few small patches of perisplenitis; both the convex and the concave surfaces showed a moderate number of rather irregular yellowish nodules up to about 5 mm. in diameter. A few projected prominently above the surface and had fibrinous fringes attached. On section the majority of the nodules were almost entirely caseous and softened.

Splenic Glands.—The splenic glands were enlarged; one was practically replaced by yellow caseo-pus, two others were congested and showed caseous patches.

Liver.—The liver was somewhat enlarged and pale. On the convex surface there was a moderate number of flattened caseous nodules with very little grey margin, the largest up to 6 mm. in diameter. On section these nodules were found to grow out of the substance.

On section through the substance of the liver there were sparsely scattered irregular caseous nodules, the majority about 1·5 mm. in diameter. In addition, mainly in the ventral portion, there were some ill-defined masses up to 2 cm. in diameter consisting of a close waxy caseous network.

Portal Glands.—The portal glands were oedematous and contained caseous patches around the cortices.

Pancreas.—The pancreas was congested, otherwise normal.

Kidneys.—The kidneys were very pale; in the cortex of the left just beneath the capsule were two caseous nodules, the largest about 5 mm. in diameter. On section a third was revealed.

On the surface of the right there was a single caseous nodule with a grey margin 1·5 mm. in diameter, and a second near the pelvis adherent to the capsule and softening in the centre.

On section there was a third nodule at the junction of the cortex and medulla.

Suprarenal Bodies.—Normal.

Lumbar Glands.—These were partly caseous.

Iliac Glands.—In the left iliac gland there was a single caseous tubercle. The right was normal.

Alimentary Tract.

Tonsils and Pharynx.—Normal.

Submaxillary Glands.—Normal.

Small Intestine.—In the mucous membrane of the small intestine there was a clean circular ulcer about a millimetre in diameter; it was situated in the neighbourhood of the caseous glands described below.

Mesenteric Glands.—The majority of the mesenteric glands were normal; two near the intestinal ulcer were partly caseous. A third contained a caseous tubercle.

Colic Glands.—Several of the colic glands contained softening caseous nodules.

Peripheral Lymphatic Glands.

Cervical Glands.—Normal.

Inguinal Glands.—In a right inguinal gland there was a single caseous tubercle.

Microscopical Examination.

Emulsion of a tubercle from the Spleen.—Tubercle bacilli scanty.

MONKEY 95. Virus H. 81. "P.W."

(A young animal.)

Subcutaneous inoculation of culture derived from the human lung.

Dose—1·0 milligramme.

Date of Inoculation—May 29, 1907.

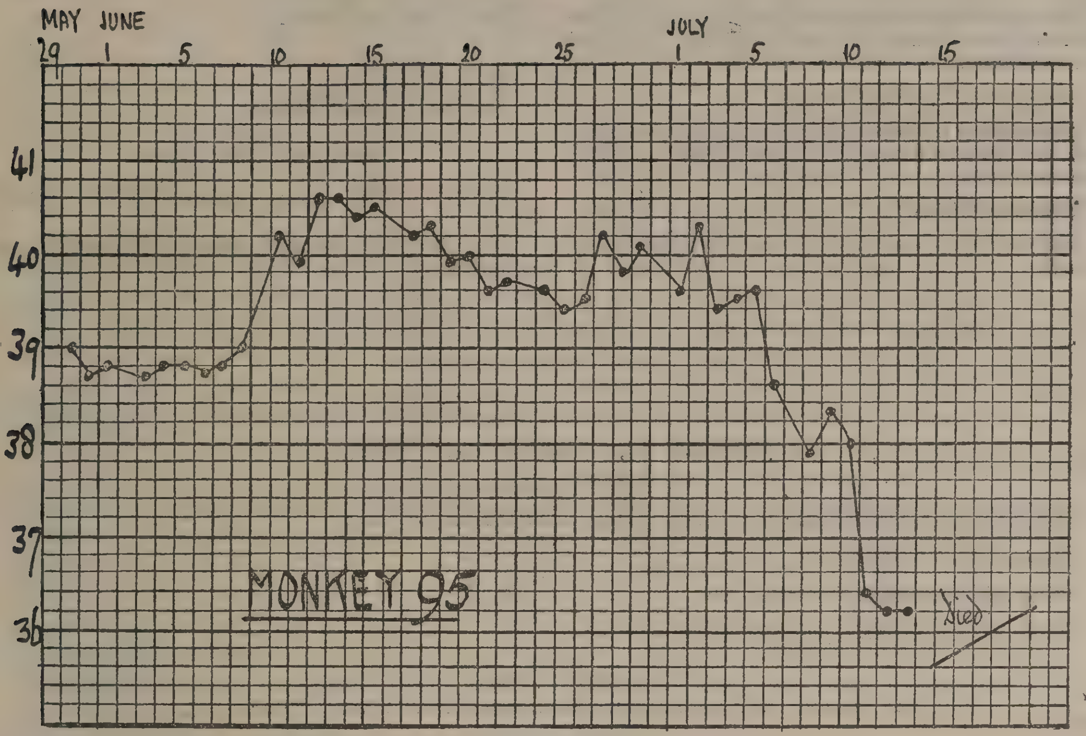
Died—July 14, 1907. [45 days after inoculation.]

Clinical Notes.

At the seat of inoculation between the shoulders a flat subcutaneous thickening developed, which on June 29 measured 7 by 4 cm. and showed a raised cystic prominence in the centre. The axillary glands on both sides became enlarged.

During the fourth week after inoculation the monkey began to look ill and to lose flesh; there was no respiratory trouble, but it became progressively weaker and more depressed, and lost its appetite. It died on the 45th day after inoculation.

Temperature.



POST-MORTEM EXAMINATION.

The carcass was emaciated.

Local Lesion.—In the subcutaneous tissues of the back between the angles of the scapulae there was a large flat saddle-shaped tumour measuring 9 cm. from side to side and 4 cm. from before backwards; the central part of the tumour was raised and fluctuant, and the skin over it thinned reddened and pierced by a few small openings; on section the central part of the tumour just under the skin was caseo-purulent, the rest being composed of dense yellow caseous substance.

Axillary Glands.—On the right side one, the size of a broad bean, was caseous throughout and softened around the margins; another smaller one showed the cortex partly caseous, while a third contained a miliary caseous tubercle.

On the left side there was one large gland similar to that on the right, and two smaller ones beset with caseous nodules of various sizes.

Cervical Glands.—On the right side one behind the clavicle showed a hemp seed sized caseous nodule, another a minute grey tubercle. On the left side a gland behind the middle of the clavicle, the size of a large pea, was caseous throughout; another near the acromial end contained two caseous nodules; other cervical glands appeared normal.

Vertebral Glands.—The glands on each side near the vertebral column in the eighth to the eleventh interspaces were enlarged (the largest 1 cm. in diameter) caseous and softened throughout.

Thorax.

Pleura.—Normal.

Lungs.—The lungs were free from adhesions; the right middle lobe, the ventral portions of the right cephalic, and the antero-ventral margins of the caudal lobes were collapsed and consolidated; the rest of the lung was crepitant. Evenly distributed throughout the substance of the lung there was a moderate number of firm caseous nodules ranging in size from a pin's head to a hemp seed; many of the nodules had congested margins.

Bronchial Glands. — The bronchial glands were enlarged, oedematous and congested and contained discrete caseous nodules, the largest the size of a hemp seed.

Heart.—There were numerous petechial haemorrhages on the surface, otherwise the heart was normal.

The pericardial sac contained a large excess of fluid.

Abdomen.

The peritoneal cavity was filled with clear serous fluid.

Omentum.—The omentum contained a number of parasitic cysts and was adherent to similar parasitic cysts in the walls of the caecum and colon; it showed also fairly numerous translucent grey miliary tubercles each apparently connected with a minute lymphatic twig.

Spleen.—The spleen was enlarged measuring 5 by 3·5 by 1·5 cm. and was closely beset with yellow softening caseous nodules ranging from 1 to 5 mm. in diameter; in several places the nodules had coalesced.

Splenic Glands.—The splenic lymphatic glands were slightly enlarged, oedematous and congested; two each contained a small caseous nodule; the rest were free from caseation.

Omentum, Portal and Pancreatic Glands.—A gland in the small omentum near the pylorus the size of a split pea was caseous throughout.

Another gland near the latter between it and the liver was a little enlarged and congested but not caseous.

A gland the size of a large pea in the hilum of the liver near the duct of the gall bladder contained several caseous nodules.

A large gland closely associated with the head of the pancreas showed the cortex extensively replaced by coalescing caseous nodules.

Liver.—The liver was somewhat enlarged, the substance was pale and very closely beset with caseous tubercles varying in size from a mere point up to two or rather more millimetres in diameter.

Kidneys.—The left kidney showed in the cortex on the surface as well as in the depth scattered miliary caseous tubercles with reddish congested margins; there were besides a number of reddish foci some of which had a greyish centre (? early tubercles).

The right kidney showed similar tubercles and in the depth of the cortex a caseous nodule 3 mm. in length.

Suprarenal Bodies.—Normal.

Lumbar Glands.—The lumbar glands were enlarged and congested; one was extensively caseous, the other contained discrete caseous nodules.

Iliac Glands.—Normal.

Alimentary Tract.

Tongue.—The mucous membrane of the tongue near the epiglottis showed a small ulcerated flattened caseous nodule.

Pharynx and Tonsils.—Normal.

Submaxillary Glands.—The submaxillary glands on each side were enlarged and beset with softened caseous nodules.

Intestines.—Normal.

Mesenteric Glands.—The mesenteric glands appeared normal.

Ileo-colic Glands.—An ileo-colic gland contained two miliary caseous tubercles.

Colic Glands.—Normal.

Brain.—Normal.

Inguinal Glands.—Normal.

Microscopical Examination.

Caseous Nodule from Tongue.—Tubercle bacilli scanty.

Tubercle from Ileo-colic Gland.—Tubercle bacilli numerous.

MONKEY 97. Virus H. 81. "P.W."

(A young animal.)

Subcutaneous inoculation of culture derived from the human lung.

Dose—0·001 milligramme.

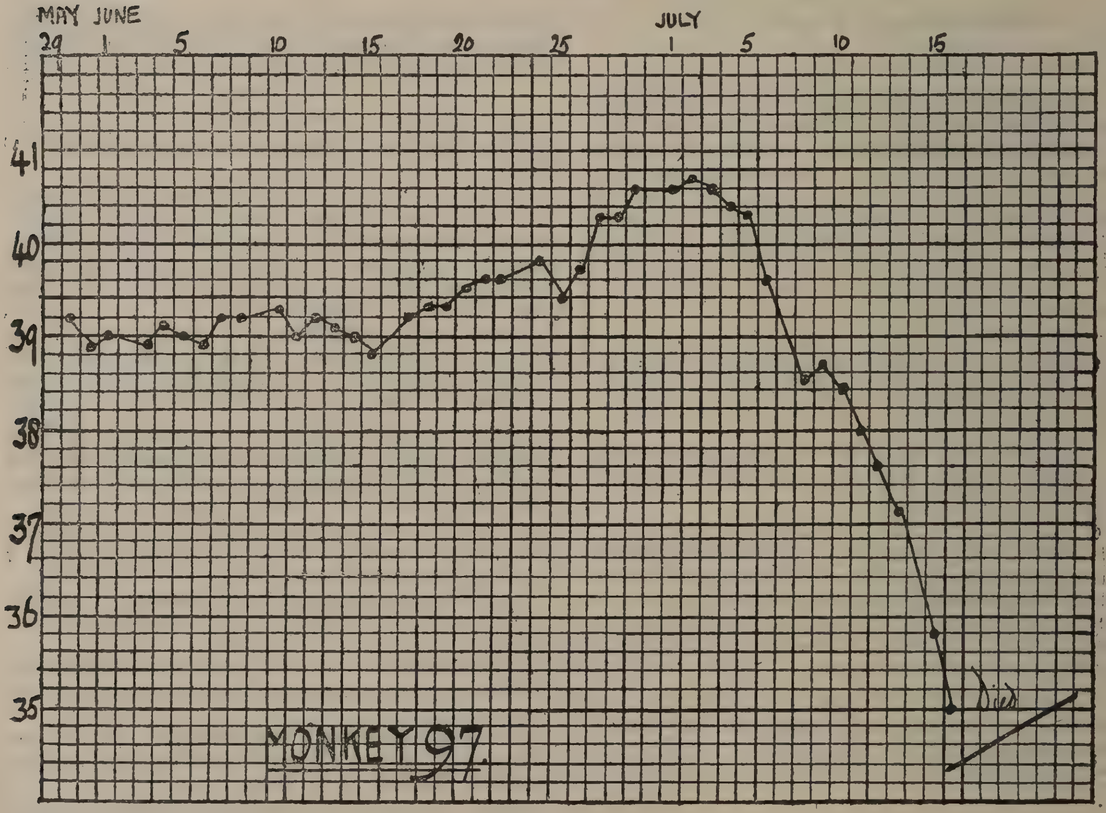
Date of Inoculation—May 29, 1907.

Died—July 17, 1907. [48 days after inoculation.]

Clinical Notes.

The course of the disease in this animal was similar to that in Monkey 95.

Temperature.



Weight (at death).—1710 grammes.

POST-MORTEM EXAMINATION.

The carcass was thin.

Local Lesion.—At the seat of inoculation immediately posterior to the angle of the right scapula, there was a rounded fluctuating swelling 3·5 cm. in greatest diameter, the skin over the centre of which was thinned, reddened, and showed two small ulcers through which thick caseo-pus could be expressed. On section the tumour was composed of caseous substance, softened except for a thin layer attached to the muscles.

Axillary Glands.—On the right side one, the size of a broad bean, was caseous throughout and almost completely softened. Another smaller gland was partly caseous. A still smaller gland contained a caseous tubercle.

On the left side one gland about a centimetre in diameter showed about three-quarters of its substance caseous. The rest were free from caseation.

Cervical Glands.—One on the right side behind the clavicle, the size of a large pea, was caseous and softened throughout. Other glands behind the clavicle on this side as well as those on the left were slightly enlarged and congested but not caseous. Other glands in the neck were normal.

Vertebral Glands.—On the right side of the vertebral column, opposite the heads of the ribs, there was a chain of six enlarged caseous and softened glands, the largest nearly a centimetre in greatest diameter. Extending under the pleura from one of these glands, about 2 cm. along the intercostal space, there was a flat caseous patch. On the left side in the 10th interspace a slightly enlarged congested gland showed one miliary caseous tubercle.

Thorax.

Pleura.—The parietal pleura along the anterior borders of the last three ribs on the right side showed fringes of congested fibrin. There was no fluid in the pleural cavities. The right caudal lobe of the lungs was adherent to the enlarged vertebral glands (see above).

Lungs.—The lungs were crepitant throughout and slightly congested; they contained a moderate number of evenly distributed shotty caseous nodules ranging in size from a pin's head to a hemp seed.

Bronchial Glands.—The intertracheo-bronchial glands were moderately enlarged, caseous and softened throughout. The praetracheo-bronchial glands were slightly enlarged and partly caseous.

Ventral Mediastinal Glands.—The one on the right side the size of a large pea was caseous and softened almost throughout. The one on the left was much smaller but was also extensively caseous.

Larynx and Trachea.—Normal.

Heart (*muscle and valves*).—Normal.

The pericardial sac contained a small quantity of yellow serous fluid.

Abdomen.

The peritoneal cavity contained a quantity of yellow serous fluid.

Omentum.—The omentum was not thickened or retracted, but was closely studded with minute greyish white tubercles.

Peritoneum.—The parietal peritoneum was normal.

Spleen.—The spleen was enlarged, measuring 6·5 by 3·3 by 1·5 cm. and was closely beset with yellow caseous breaking-down nodules varying in size from a millet seed to a large pea; the majority of those just under the capsule caused slight projections from the surface.

Splenic Lymphatic Glands.—In the hilum of the spleen there were several slightly enlarged glands, the substance of which was extensively replaced by softened caseous nodules.

Liver.—The liver was slightly enlarged, the substance was paler than normal and very closely beset with caseous tubercles ranging in size from a mere point up to two and occasionally more millimetres in diameter.

Kidneys.—The left kidney showed in the cortex a caseous nodule almost the size of a hemp seed and a pinhead sized caseous tubercle as well as several minute congested grey tubercles.

In the cortex of the right kidney there were two yellow caseous nodules, the largest 2 mm. in diameter, and a few minute grey foci.

Suprarenal Bodies.—Normal.

Various Abdominal Glands.—A gland in the small omentum near the pylorus contained a softened caseous tubercle.

A gland near the cardiac end of the stomach (? coeliac) the size of a large pea was caseous and softened throughout.

There were several enlarged glands lying in close contact with the head of the pancreas which were caseous and softened throughout.

The lumbar glands were slightly enlarged; one the size of a pea was caseous almost throughout, two others contained discrete caseous nodules.

The iliac glands were normal.

Alimentary Tract.

Tongue, Tonsils, and Pharynx.—Normal.

Submaxillary Glands.—One contained a soft caseous tubercle.

Mesenteric Glands.—One mesenteric gland contained a pea-sized softened caseous nodule. Another contained a single caseous tubercle.

Ileo-colic Glands.—One contained a caseous tubercle.

Colic Glands.—Two colic glands contained each a small caseous tubercle, while another showed the greater part of the cortex in a state of early caseation.

Testicles.—Normal.

Brain.—Normal.

Inguinal Glands.—One of the left inguinal glands contained a caseous softened tubercle. Those on the right were normal.

Microscopical Examination.

Tubercle from Left Inguinal Gland.—Tubercle bacilli numerous.

MONKEY 99. Virus H. 81. "P.W."

(A young animal.)

Subcutaneous inoculation of culture derived from the human lung.

Dose—0·00001 milligramme.

Date of Inoculation—May 29, 1907.

Died—July 18, 1907. [49 days after inoculation.]

Clinical Notes.

The course of the disease in this animal was similar to that in Monkey 95.

Weight (*at death*).—1560 grammes.

POST-MORTEM EXAMINATION.

The body was thin.

Local Lesion.—At the seat of inoculation near the angle of the right scapula there was a slightly raised somewhat irregular tumour measuring 5 by 3·5 by 1·5 cm. On section it was composed of yellow caseous substance, firm around the margins and soft and purulent in the centre. The skin near one margin showed a small ulcer through which caseo-pus could be expressed.

Axillary Glands.—On the right side there was one large gland 2 cm. in greatest diameter which was caseous and softened throughout. Another smaller gland contained discrete caseous nodules, and one the size of a hemp seed was caseous throughout.

On the left side one slightly enlarged gland was about half caseous, another contained a miliary caseous tubercle.

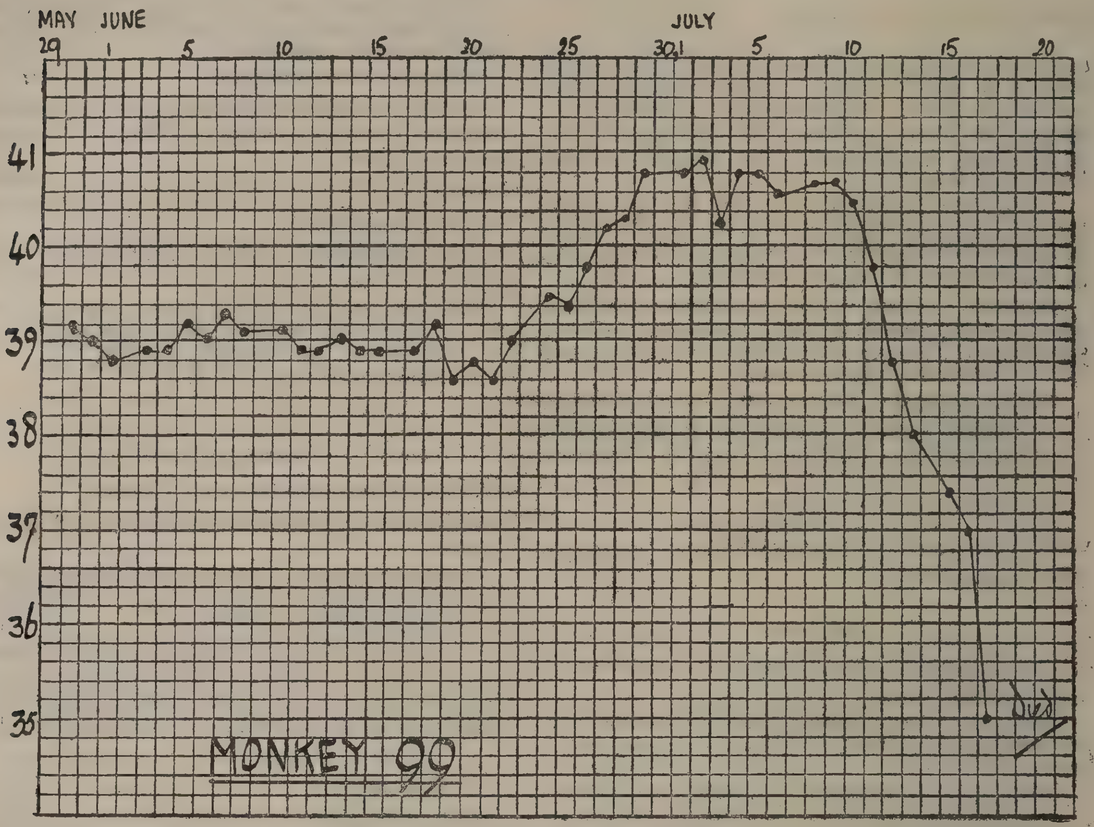
Cervical Glands.—On the right side behind the clavicle there were five enlarged glands up to a pea in size, most of which were caseous throughout, the rest contained caseous nodules.

Behind the clavicle on the left side two enlarged glands contained discrete softened caseous nodules.

Vertebral Glands.—On the right side of the bodies of the 6th to the 9th vertebrae there was a chain of enlarged prominent caseous and softened glands.

On the left side in the 6th to the 9th interspaces near the column there was a chain of four slightly enlarged congested glands, each of which contained a miliary caseous tubercle.

Temperature.



Thorax.

There was no fluid in the pleural cavities. The right caudal lobe of the lung was slightly adherent to the enlarged vertebral glands.

On the pleural surface of the pericardium there was one millet seed sized caseous tubercle.

Lungs.—The lungs were pinkish and crepitant throughout; they contained a moderate number of evenly distributed shotty caseous nodules varying in size from 1 to 3 mm. in diameter.

Bronchial Glands.—The bronchial glands, praetracheo- and intertracheo-, were much enlarged caseous and softened practically throughout.

Dorsal Mediastinal Glands.—There was a small group of slightly enlarged glands on the bodies of the vertebrae near the diaphragm, the substance of which was partly replaced by caseous nodules.

Sternal Glands.—The sternal glands were slightly enlarged and caseous practically throughout.

Heart (muscles and valves).—Normal.

The pericardial sac contained a quantity of blood-stained serous fluid.

Abdomen.

There was no excess of fluid in the peritoneal cavity.

Omentum.—The omentum showed near the spleen and along its attachment to the colon fairly numerous tubercles, the largest the size of a pin's head, mostly translucent with opaque centres, a few yellow and caseous.

Peritoneum.—Normal.

Spleen.—The spleen was enlarged, measuring 6·5 by 3·5 by 1·5 cm. and showed under the capsule as well as in the depth very numerous soft caseous nodules varying in size up to that of a pea; they were in places confluent and extensively replaced the spleen substance.

Splenic Lymphatic Glands.—There were about half a dozen slightly enlarged glands in the hilum of the spleen, each of which contained one or two discrete caseous nodules.

Liver.—The liver was slightly enlarged, the substance was paler than normal and very closely beset with yellow caseous tubercles and nodules varying in size from a point just visible to the naked eye up to 5 mm. or more in diameter.

Portal Gland.—In the hilum of the liver there was a pea-sized gland, caseous and softened throughout.

Kidneys.—The right kidney showed in the cortex four yellow caseous nodules 1·5 to 3 mm. in diameter, and five greyish-white tubercles just visible to the naked eye.

In the cortex of the left there were about half a dozen caseous nodules and a few minute greyish-white tubercles.

Suprarenal Bodies.—Normal.

Omental Gland.—In the small omentum near the pylorus there was a pea-sized gland caseous and softened throughout.

Pancreatic Glands.—Closely incorporated with the head of the pancreas were two large glands which were caseous and softened throughout. Other pancreatic glands appeared normal.

Iliac Glands.—One on the left side contained two millet seed sized caseous tubercles. Another at the junction of the ilium and sacrum contained a pinhead sized caseous tubercle. Those on the right side were normal.

Lumbar Glands.—These glands were enlarged and caseous practically throughout.

Alimentary Tract.

Tonsils, Pharynx.—Normal.

Tongue.—Under the mucous membrane at the base of the tongue there were two pinhead sized caseous tubercles.

Submaxillary Glands.—There were a few caseous nodules up to a hemp seed in size in the submaxillary lymphatic glands.

In each submaxillary salivary gland there was a yellow miliary caseous tubercle.

Retropharyngeal Glands.—The right retropharyngeal gland contained a caseous tubercle.

Intestines.—The walls of the small intestine were deeply congested; no tubercles were seen.

The large intestine was normal.

Mesenteric Glands.—The mesenteric glands were congested and contained half a dozen softened caseous nodules, the largest about the size of a hemp seed.

Ileo-colic and Colic Glands.—One ileo-colic gland contained two miliary caseous tubercles.

About half a dozen of the colic glands contained each a minute caseous tubercle.

Brain.—Normal.

Testicles.—Normal.

In the subcutaneous tissues of the abdominal wall a little to the right of the umbilicus there was a millet seed sized shotty caseous tubercle.

Inguinal Glands.—The right inguinal gland contained three, the left half a dozen, soft caseous nodules varying in size from a millet seed to that of a hemp seed.

Microscopical Examination.

Tubercle from Tongue.—Tubercle bacilli extremely numerous.

Tubercle from Subcutaneous Tissues near umbilicus—Tubercle bacilli extremely numerous.

Emulsion of Spleen.—Tubercle bacilli very numerous.

Nodule from Inguinal Gland.—Tubercle bacilli extremely numerous.

HORSE 1. Virus H. 81. "P.W."

Subcutaneous inoculation of culture derived from the human lung.

Dose—50·0 milligrammes.

Date of Inoculation—September 13, 1907.

Age—Probably 18 or more years old.

Killed when in good health—January 7, 1908. [116 days after inoculation.]

Clinical Notes.

A small fluctuating tumour rapidly developed at the seat of inoculation on the left side of the neck; it opened and discharged eight days after the inoculation.

Thirty five days after inoculation there was a local ulcer measuring 5 by 2·5 cm. with a slightly thickened margin and floor covered with masses of dried discharge. The adjacent prescapular gland was not felt.

The ulcer subsequently healed, only a linear scar remaining to mark the site of the inoculation.

The horse remained well during the experiment.

Temperature.

Normal throughout.

Tuberculin Tests.

October 24, 1907. [41 days after inoculation.] Dose, 3·0 cc. Reacted. Rise of temperature, 2·4° C.

October 30, 1907. [47 days after inoculation.] Dose, 6·0 cc. Reacted. Rise of temperature, 2·4° C.

Weights.

	cwt.	qr.	lbs.
September 13, 1907	6	1	0
January 7, 1908	6	0	17

Total loss of weight.—11 lbs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—The skin at the site of inoculation on the left side of the neck showed a linear scar 4 cm. in length; the subcutaneous tissues under the scar were a little thickened and showed a series of softened caseous nodules the largest about 3 or 4 mm. in diameter.

Left Prescapular Gland.—The left prescapular gland was composed of a group of small glands; one of these contained a pea-sized cheesy caseous nodule not perceptibly gritty.

Right Prescapular Gland; Prepectoral, Cervical and Axillary Glands.—Normal.

Thorax.

Pleura, Heart.—Normal

Lungs.—There were some slender fibrous adhesions to the diaphragm. The lung substance was normal.

Bronchial and Mediastinal Glands.—Normal.

Abdomen.

Omentum and Peritoneum, Spleen, Kidneys and Suprarenal Bodies.—Normal.

Liver.—The liver was adherent to the diaphragm; the substance contained a number of hydatid cysts varying in size from a small pea to a hen's egg; there was no sign of tuberculosis.

Portal, Coeliac, Iliac and Lumbar Glands.—Normal.

Alimentary Tract.

Tongue, Pharynx, Tonsils.—Normal.

Submaxillary and Retro-pharyngeal Glands.—Normal.

In the tissues between the wall of the pharynx and the vertebral column, just in front of the larynx, there was a firm tumour the size of a hen's egg composed of dense white fibrous tissue with small cavities in the centre containing pus.

Intestines and Mesenteric Glands.—Normal.

Various Lymphatic Glands.

Precrural, Popliteal, Gluteal, Ischiatic, Pudic.—Normal.

Microscopic Examination.

Emulsion of Prescapular Gland.—Tubercle bacilli in moderate numbers.

Pus from Laryngeal Abscess.—No tubercle bacilli. A few chains of streptococci seen.

Animals Inoculated.

Two guinea-pigs, Nos. 2865* and 2866, were inoculated intraperitoneally with an emulsion made from the left prescapular gland (died in 78 and 106 days respectively of general tuberculosis) ; one, No. 2864, intraperitoneally with an emulsion made from the spleen (killed after 115 days, healthy) ; and one, No. 2867, intraperitoneally with an emulsion made from a portion of the liver including one small cyst (died in 43 days ; no tuberculosis, cause of death not apparent).

HORSE 3 Virus H. 81. "P.W."

Fed with culture derived from the human lung.

Dose and date of Feeding—On September 13, 1907, 100·0 mg. of culture were given to the horse in two quarts of water. He did not drink more than half of it, and spilled some of the rest. On the following day 50·0 mg. was added to the water that remained in the bucket, and the whole was drunk by the animal, who therefore received a dose of from 100·0 to 150·0 milligrammes.

Age—Probably 18 or more years old.

Killed when well—January 21, 1908. [130 days after feeding.]

Clinical Notes.

The horse remained well during the experiment.

Temperature.

Normal throughout.

Tuberculin Tests.

October 24, 1907. [41 days after inoculation.] Dose, 3·0 cc. Reacted. Rise of temperature, 1·9° C.

October 30, 1907. [47 days after inoculation.] Dose, 6·0 cc. Reacted. Rise of temperature, 2·0° C.

Weights.

	cwt.	qrs.	lbs.
September 13, 1907	6	2	17
January 21, 1908	6	1	10

POST-MORTEM EXAMINATION.

The carcass was fat.

Liver.—The liver contained about a dozen cysts the largest the size of a hempseed with thick fibrous walls and a small empty cavity in the centre. Otherwise the liver was normal.

All the other organs and all the glands were normal, and no tuberculous lesions were found anywhere in the body.

Animals Inoculated.

One guinea-pig was inoculated intraperitoneally with each of four emulsions.

Of spleen, No. 2902 ; of liver, No. 2903 ; of bronchial gland, No. 2904 ; of submaxillary gland, No. 2905. No. 2902 died in 27 days (cause unknown) and showed no tuberculosis ; Nos. 2903 and 2904 were killed after 56 days and found healthy ; No. 2905 died in 56 days and was also free from tuberculosis.

DOG 35. [Young adult.] Virus H. 81. "P.W."

Fed with culture derived from the human lung.

Dose—50·0 milligrammes.

Date of Feeding—April 12, 1907.

Killed when in good health—July 23, 1907. [102 days.]

Temperature.—The temperatures of the dog were recorded from June 11 to July 5, 1907. During this period they were normal, the range of variation being 0·7° C. (38·7–39·4° C.).

Tuberculin Test.—July 5. [84 days after experiment.] Reacted. Rise of temperature, 1·2° C.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

There was no sign of tuberculosis in any organ or gland.

DOG 43. [Puppy.] Virus H. 81. "P.W."

Intravenous inoculation of culture derived from the human lung.

Dose—1·0 milligramme.

Date of Inoculation—August 6, 1907.

Died—September 8, 1907. [33 days after inoculation.]

POST-MORTEM EXAMINATION.

The carcass was emaciated.

Thorax.

Heart.—In the muscle wall of the right ventricle a small opaque well-defined tubercle was seen. The heart was otherwise normal.

Lungs.—The lungs were air-containing and presented no patches of collapse or consolidation. They showed everywhere on the surface numerous evenly distributed translucent grey tubercles, the majority with minute opaque centres. They were mostly discrete, but here and there a few had run together, forming small irregular grey areas.

On section the tubercles were evenly and thickly distributed throughout the lungs.

Bronchial Glands.—A left bronchial gland was much enlarged (2 by 1·3 cm.), very hard, and on section was fibroid with large irregular yellow homogeneous areas in the cortex (early caseation).

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* Injection partly subcutaneous.

A gland on the same side outside the fork of the trachea, also much enlarged (3·5 by 1 cm.) was similar on section. Three glands grouped around the bifurcation of the trachea on the right side (right bronchial) were enlarged and also similar on section.

Sternal Glands.—These were deeply congested and soft; no tubercles were visible.

Pleura and Diaphragm.—Normal.

Abdomen.

There was a great excess of bloodstained peritoneal fluid.

Omentum.—The omentum at first appeared like a mass of black blood-clot; on close examination the vessels were seen to be greatly distended with blood, and there were two large irregular clots attached to the omentum near its free border. No tubercles could be seen.

Peritoneum.—Normal.

Intestines.—The caecum was distended, dark red and full of altered blood, and the walls were much thicker than normal. There was no obstruction to the free passage of fluid from the caecum to the intestine, though the opening of the congested and distended portion into the large intestine was somewhat constricted.

The intestines were otherwise normal.

Mesenteric Glands.—Normal

Ileo-colic Glands.—Deeply congested, otherwise normal.

Spleen.—The spleen was greatly enlarged and mottled with dark red areas; it measured 17·5 by 5·0 by 1·5 cm. The surface was finely granular, numerous whitish or yellowish opaque points and foci being seen both in the dark red and the paler areas. The larger of these foci were about 1 mm. in diameter. They were equally numerous on section. They were soft, and neither caseous nor calcareous when crushed.

Pancreas.—Normal.

Liver.—The liver was very large and pale (weight 470 grms.). No tubercles were seen on surface or on section. The organ was quite bloodless.

Portal Glands.—The portal glands were very firm; on section numerous irregular yellow areas were seen in the cortex (early caseation).

Kidneys.—The kidneys were very pale, and yellowish white in colour. On stripping off the capsules numerous small pitted depressions were seen, and the left kidney also showed many irregular depressed canary-yellow necrotic-looking areas which extended as wedges into the cortex.

No tubercles were seen on the surface or on section.

Suprarenal Bodies.—The left suprarenal was very firm and the cortex appeared in places to be undergoing fibroid change. No definite tubercles were seen. The right was also firm, but appeared normal on section.

Lumbar and Iliac Glands.—Normal.

Tongue, Pharynx, and Tonsils.—Normal.

Submaxillary and Cervical Glands.—Normal.

Axillary Glands.—The right was very tough and fibrous, but showed no definite tubercles. The left was similar.

Microscopical Examination.

(Smear preparations.)

Liver, Scraping from.—Tubercle bacilli exceedingly numerous.

Spleen, Scraping from.—Tubercle bacilli moderately numerous.

Kidney, Scraping from.—No tubercle bacilli seen.

Left Suprarenal, Scraping from.—No tubercle bacilli seen.

Bronchial Gland, Scraping from.—Tubercle bacilli exceedingly numerous.

Portal Gland, Scraping from.—Tubercle bacilli exceedingly numerous.

Portal Gland, Emulsion of.—Tubercle bacilli scanty.

CAT 39. Virus H. 81. "P.W."

Fed with culture derived from the human lung.

Dose—50·0 milligrammes.

Date of Inoculation—April 12, 1907.

Killed when in good health—July 31, 1907. [110 days after feeding.]

Weights.

	grammes.
April 12, 1907	1650
July 31, 1907	1920

Gain of weight.—270 grammes.

POST-MORTEM EXAMINATION.

There was no sign of tuberculosis in any of the organs or glands.

Microscopical Examination.

(Smears from :—)

Lung.—No tubercle bacilli.

Mesenteric Gland.—No tubercle bacilli.

CAT 45. Virus H. 81. "P.W."

Intraperitoneal inoculation of culture derived from the left prescapular gland of Calf 1145.

Dose—50·0 milligrammes.

Date of Inoculation—August 1, 1907.

Died—October 24, 1907. [84 days after inoculation.]

Weights.

	grammes.
August 1, 1907	3050
October 24, 1907	1750

Total loss of weight.—1,300 grammes.

POST-MORTEM EXAMINATION.

Spontaneous tuberculosis.

Abdomen.

Local Lesion.—In the subcutaneous and subperitoneal tissues of the abdominal wall there was a small caseous mass.

Omentum and Peritoneum.—The omentum was not thickened but was adherent to the spleen; the peritoneum was normal.

The Spleen, Liver, Kidneys, and Suprarenal Bodies were free from tuberculosis.

Intestines.—Normal.

Mesenteric Glands.—The terminal mesenteric gland was a little enlarged and its substance extensively replaced by yellow caseous nodules up to a hempseed in size.

Thorax.

Lungs.—The lungs were collapsed; the posterior half of the right caudal lobe was occupied by large firm grey fibroid areas containing yellow caseous patches some of which had broken down and formed cavities; in the left caudal lobe there were some isolated nodules of a similar nature; in the rest of the lung a few small grey tubercles were found.

Other organs and glands were normal.

Microscopical Examination.

Emulsion of caseous mesenteric gland ...	Tubercle bacilli numerous.
Emulsion of the lung	

A culture isolated from the lung grew like a bovine bacillus and produced fatal generalised tuberculosis in two rabbits inoculated intravenously with 0·1 and 0·01 mg.

CAT 47. Virus H. 81. "P.W."

Intraperitoneal inoculation of culture derived from the left prescapular gland of Calf 1145.

Dose—10·0 milligrammes.

Date of Inoculation—August 1, 1907.

Died—October 14, 1907. [74 days after inoculation.]

Weights.

	grammes.
August 1, 1907	2,500
October 14, 1907	1,300

Total loss of weight.—1,200 grammes.

POST-MORTEM EXAMINATION.

Abdomen.

The inoculation was apparently subperitoneal.

Local Lesion.—Immediately above the xiphisternum, lying apparently in the subperitoneal tissues, there was a mass rather larger than a pigeon's egg composed of creamy-white breaking-down caseous substance.

Omentum.—The omentum was adherent to it, but was itself normal.

Sternal Glands.—The sternal glands appeared a little enlarged but showed no sign of caseation.

Peritoneum, Liver, Spleen, Kidneys, Intestines and Abdominal Lymphatic Glands.—Normal.

Thorax.

Lungs.—The lungs were crepitant throughout and collapsed normally; under the pleura of the dorsal surface of the right caudal lobe there were a few (about half-a-dozen) irregular grey nodules (parasitic) with no sign of caseation. There were three or four small grey nodules on the dorsal surface of the left caudal lobe above the root. Otherwise the lungs were normal.

Bronchial Glands, Heart, Pleura.—Normal.

Microscopical Examination.

Nodule from Lung ...	No tubercle bacilli; a number of worm-like embryos seen.
Smear from Sternal Gland	

VIRUSES H. 82. "G.F." and H. 83. "G.C."

GENERAL TUBERCULOSIS PRIMARY IN THE ALIMENTARY TRACT.

AND

VIRUS H. 86. "C.P."

TUBERCULOSIS PRIMARY IN THE LUNG.

VIRUS H. 82 "G.F."

(February 7, 1907.)

CULTURE INOCULATIONS.

MESENTERIC GLANDS.

August 9, 1907.

The strain was derived from the human mesenteric glands, through G.P. 2239, and had been in artificial cultivation a total period of 87 days.

The culture used was the 5th generation, 20 days old.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1427	Intrav.	1·0 mg.	D. 75 days.	T. of lungs and kidneys.
1428	Intrav.	0·1 mg.	D. 158 „	T. of lungs, bronchial gland (slight), and kidneys.
1429	Subcut.	10·0 mg.	K. 168 „	Local lesion. Slight T. of lungs and kidneys.
1430	Subcut.	1·0 mg.	K. 168 „	Local lesion and T. of the lungs.

LUNG.

May 27, 1907.

The strain was derived from the human lung, through G.P. 2242, and had been in artificial cultivation a total period of 81 days.

The culture used was the 5th generation, 22 days old.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1301	Intrav.	1·0 mg.	K. 117 days.	T. of lungs, kidneys, and right epididymis.
1302	Intrav.	0·1 mg.	D. 36 „	Slight T. of lungs and kidneys. (?) cause of death.
1303	Intrap.	10·0 mg.	D. 22 „	Early G.T., with pseudo-tuberculosis.
1304	Subcut.	50·0 mg.	D. 39 „	Local T. The right caudal lobe of the lung was occupied by caseous masses, apparently not tuberculous.
1305	Subcut.	10·0 mg.	K. 117 „	Local T., and slight T. of lungs.

GUINEAPIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
2442	Intrap.	1·0 mg.	D. 24 days.	G. T. with pseudo-tuberculosis of mesenteric glands.
2444	Intrap.	0·1 mg.	D. 161 „	G. T.
2443	Subcut.	1·0 mg.	D. 76 „	G. T.
2445	Subcut.	0·1 mg.	D. 94 „	G. T.

VIRUS H. 83. "G.C."

CULTURE INOCULATIONS.

MESENTERIC GLAND.

May 28, 1907.

The strain was derived directly from a mesenteric gland, and had been in artificial cultivation a total period of 95 days.

The culture used was the 5th generation, 21 days old.

GUINEAPIGS.

Method.	Dose.	Duration of Life.	Result.
Intrap.	0·1 mg.	D. 38 days	G.T.
Subcut.	0·1 mg.	D. 120 "	G.T.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1307	Intrav.	1·0 mg.	D. 38 days	Slight T. of lungs, bronchial glands, and kidneys. ? cause of death.
1308	Intrav.	0·1 mg.	K. 126 "	Slight T. of lungs and kidneys.
1309	Intrap.	10·0 mg.	D. 16 "	Slight T. of peritoneum. Death from pseudotuberculosis of the mesenteric glands.
1310	Subcut.	50·0 mg.	D. 38 "	Local T., one tubercle in kidney, and one or two doubtful tubercles in the lung. ? cause of death.
1311	Subcut.	42·0 mg.	D. 3 "	Local T., and slight T. of lungs and kidneys. ? cause of death.

BRONCHIAL GLAND.

May 28, 1907.

The strain was derived directly from a bronchial gland, and had been in artificial cultivation a total period of 95 days.

The culture used was the 4th generation, 21 days old.

GUINEAPIGS.

Method.	Dose.	Duration of Life.	Result.
Intrap.	1·0 mg.	D. 95 days	G.T., with pseudotuberculosis.
Subcut.	1·0 mg.	D. 81 "	G.T.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1312	Intrav.	1·0 mg.	D. 13 days	Early T. of lungs.
1313	Intrav.	0·1 mg.	D. 22 "	G.T., and pseudotuberculosis of mesenteric glands.
1314	Intrap.	10·0 mg.	D. 5 "	Gastritis.
1315	Subcut.	50·0 mg.	K. 126 "	Local T. only.
1316	Subcut.	50·0 mg.	D. 25 "	Local T. and slight T. of lungs. ? cause of death.

VIRUS H. 86. "C.P." [Meninges.]

CULTURE INOCULATIONS. JULY 15, 1907.

The strain was derived from the human meninges, through G.P. 2395, and had been in artificial cultivation a total period of 57 days. The culture used was the 3rd generation, 21 days old.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1384	Intrav.	1·0 mg.	D. 167 days	Chronic G.T.
1385	Intrav.	0·1 mg.	K. 221 „	Chronic G.T.
1386	Intrap.	10·0 mg.	K. 220 „	Chronic G.T.
1387	Intrap.	1·0 mg.	K. 221 „	Slight G.T.
1388	Subcut.	50·0 mg.	D. 206 „ (injuries).	Local T. and slight T. of lungs.
1389	Subcut.	10·0 mg.	K. 220 „	Local T. only.

GUINEAPIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
2503	Intrap.	1·0 mg.	D. 29 days	G.T.
2504	Subcut.	1·0 mg	D. 83 „	Chronic G.T.

HEDGEHOG 1.

Subcutaneous. Dose : 10·0 mg.
Died : Sept. 8, 1907. 55 days.

P.M.—General tuberculosis was produced by the inoculation, but death was the result of a secondary infection caused by organisms which had entered the body apparently through an abrasion on the nose.

POST-MORTEM EXAMINATION OF HEDGEHOG.

The carcass was fat.

Local Lesion.—At the seat of inoculation in the abdominal wall (in the mid line) there was a large projecting fluctuating tumour measuring 6 by 3·5 cm., composed of a thin fibrous wall and softened caseous contents ; it did not infiltrate the subjacent muscle.

Inguinal Glands.—One on the right side contained a pinhead sized soft yellow focus. Those on the left side were normal.

Axillary Glands.—One on the right side was slightly enlarged and showed in the cortex three or four soft yellow tubercles, the largest 1 mm. in diameter.

The skin over the root of the nose was ulcerated and covered with masses of dried secretion ; the base and floor of the ulcer were formed by a mass of soft reddish granulation tissue.

On the right side of the neck there were several large caseo-purulent masses (apparently partly composed of the submaxillary and cervical glands) which extended in the subcutaneous tissues from the scapula to the angle of the jaw and the right eye ; the underlying muscles were here and there infiltrated with tubercles. Extending to the back of the neck also were many caseous nodules and smaller foci both in the subcutaneous tissues, the muscles, and between the muscles.

There was no connection between these lesions and the tumour at the seat of inoculation.

In the corresponding situation on the left side, a submaxillary gland was much enlarged and contained a large softening caseous nodule, and a cervical gland showed two yellowish tubercles ; several other glands lying between the maxilla and the clavicle were normal.

Abdomen.

Peritoneum.—Under the peritoneum, on the left side near the lumbar vertebrae were two caseous and softened nodules (cysts), the larger 0·75 by 0·5 cm. Elsewhere on the somatic peritoneum there were a few yellow foci and streaks.

Spleen.—The spleen measured 7 by 1·5 cm. On the surface numerous pinpoint tubercles were just visible. On section one yellowish nodule 2 mm. in diameter was seen, and two or three nearly 1 mm. in diameter.

Liver.—The substance of the liver showed under the capsule very numerous whitish tubercles of various sizes varying from a mere point to nearly 2 mm. in diameter. Similar tubercles were seen on section.

Portal Glands.—These glands showed only one or two opaque foci in the cortices

Kidneys.—The surface of the right kidney showed a moderate number of white tubercles up to 1 mm. These extended as wedges into the cortex. No definite tubercles were seen in the depth.

The left was similar ; in addition there was one large tubercle on the surface (2 mm.) extending 3 mm. into the cortex ; and a few tubercles were also seen on section in the depth.

Suprarenal Bodies.—In the cortex of the left there were several irregular wedge-shaped yellowish areas. The right was normal.

Iliac Glands.—The left iliac gland was enlarged, caseous and softened. The right was normal.

Thorax.

Pleura and Diaphragm.—The lungs were collapsed and the thoracic cavity contained a large quantity of thin turbid fluid. The lungs were adherent to the pleura and diaphragm, and the latter were covered with a granular layer of flaky lymph.

Heart and Pericardium.—There was severe pericarditis and the surface of the heart was roughened and covered with flaky lymph. No tubercles were seen on section.

Lungs.—The lungs contained several tuberculous nodules, irregular in outline, and on section yellow and fibro-caseous ; the largest measured 1·0 by 0·6 cm. Some projected from the surface of the lung, others were visible only on section. There were about half a dozen in all ; a few smaller tubercles were also seen.

Bronchial Glands.—One was enlarged and showed a few minute yellowish tubercles. A smaller gland was caseous almost throughout.

Alimentary Tract.

Tongue.—In the muscle of the upper surface of the tongue there was a group of small irregular yellowish tubercles.

Intestines.—No sign of tuberculosis was visible on external examination.

Other organs and glands were examined and found normal.

Microscopical Examination.

Tubercle from Tongue.—Tubercle bacilli moderately numerous.

Left Suprarenal (scraping from).—A few clumps of tubercle bacilli seen.

Pleural Fluid.—Very numerous small and large bacilli with cocci and lymph cells, and a few tubercle bacilli.

Caseous Material from Neck.—Few tubercle bacilli, cocci and large bacilli.

Liver (tubercle from).—No tubercle bacilli, cocci and very numerous blue bacilli.

Inguinal Gland (tubercle from).—Few tubercle bacilli, cocci and very numerous blue bacilli.

VIRUS H. 87. "W. D."

TUBERCULOSIS OF THE SUPRARENAL BODIES.

VIRUS H. 87. "W. D."

ADDISON'S DISEASE.

(April 26, 1907.)

CULTURE INOCULATIONS.

I.—June 21, 1907.

The strain was derived from the human suprarenal body through a guineapig, and had been in artificial cultivation a total period of 56 days.

The culture used was the third generation, 21 days old.

CALF 1253.

Subcutaneous.

Dose: 50·0 mg.

Killed: October 1, 1907.

102 days.

P.M.—At the seat of inoculation there was a small cyst. In the left prescapular gland there were two small fibro-calcareous nodules. In the ileo-colic glands there were scattered calcareous tubercles; a mesenteric gland contained one.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1342	Intrav.	10·0 mg.	D. 26 days.	T. of lungs, bronchial glands and kidneys.
1343	Intrav.	1·0 mg.	D. 14 "	T. of lungs and bronchial glands; T.B. in spleen.
1344	Intrap.	10·0 mg.	K. 152 "	Local T. and one tubercle in the lung.
1345	Intrap.	1·0 mg.	D. 12 "	T. of peritoneum only.
1346	Subcut.	50·0 mg.	D. 11 "	Local T. and slight T. of the lungs. Psorospermosis of the liver.
1347	Subcut.	10·0 mg.	D. 15 "	Local tuberculosis only. ? Cause of death.

GUINEAPIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
2476	Intrap.	1·0 mg.	D. 15 days.	Slight G. T.
2477	Subcut.	1·0 mg.	D. 244 "	Chronic G. T.

II.—July 3, 1907.

The same strain.

Total duration of artificial cultivation: 68 days.

The culture used was the fifth generation, 21 days old

PIG 91.

Subcutaneous.

Dose: 50·0 mg.

Killed: October 11, 1907.

100 days.

P.M. — Small cystic local tumour, with softened caseous contents. The adjacent inguinal and precrural glands contained caseous nodules or tubercles. On the surface of the lungs there were a few scattered tubercles, and two small groups of nodules the majority with caseous gritty centres, the others translucent throughout.

PIG 95.

Subcutaneous.

Dose: 40·0 mg.

Killed: October 15, 1907.

104 days.

P.M. — Small local tumour, composed of soft pultaceous material in a thin fibrous capsule. The adjacent inguinal and precrural glands contained a few small soft caseous gritty nodules; one ventral mediastinal gland showed a few caseo-calcareous tubercles.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1369	Subcut.	1·0 mg.	K. 148 days.	No T.
1370	Subcut.	10·0 mg.	K. 148 "	Local lesion and one tubercle in the lung.

CALF 1253. Virus H. 87. "W.D."

Subcutaneous inoculation of culture derived from the human suprarenal body through a guinea-pig.

Dose—50·0 milligrammes.

Date of Inoculation—June 21, 1907. [Age about 12 weeks.]

Killed when in good health—October 1, 1907. [102 days after inoculation.]

Clinical Notes.

A small prominent tumour which did not ulcerate developed at the seat of inoculation on the left side of the neck, and the adjacent prescapular gland became slightly enlarged.

The calf remained in good health and condition during the experiment, and grew normally.

Temperature.—Ten days after the inoculation there was a slight rise of temperature (maximum 40·1° C.), lasting six days only. Subsequently the temperature was normal.

Tuberculin Test.—The calf was not tested subsequent to inoculation.

Weights.

	cwt.	qrs.	lbs.
June 21, 1907	1	0	16
October 1, 1907	2	0	9

Total gain of weight.—3 qrs. 21 lbs.

Average rate of gain per week.—7 lbs.

POST-MORTEM EXAMINATION.

The carcass was fat.

Local Lesion.—At the site of inoculation on the left side of the neck there was a small cyst, measuring 7 by 5 by 3·5 cm., with thick fibrous walls and caseo-purulent contents; the cavity was lined with granulation tissue and crossed by several thick fibrous trabeculae.

Left Prescapular Gland.—The left prescapular gland measured 5·5 by 2·5 by 1·8 cm.; in the cortex at one extremity there was a pea-sized brownish translucent fibrous nodule containing calcareous points; in the medulla of the gland there was a similar but rather smaller nodule.

Right Prescapular Gland.—The right prescapular gland measured 5 by 2 by 1 cm. and was normal on section.

Prepectoral and Axillary Glands.—Normal.

Thorax.

Pleura, Lungs, Thoracic Glands, Heart.—Normal.

Abdomen.

Omentum, Peritoneum, Liver, Portal Glands, Spleen.—Normal.

Kidneys.—The right kidney showed in the cortex numerous pale grey spots of a doubtful nature; no tubercles were seen. The left kidney was normal.

Suprarenal Bodies, Renal, Lumbar, and Iliac Glands.—Normal.

Testes.—Normal.

Alimentary Tract.

Tongue, Pharynx, Palate, Tonsils; Submaxillary, Hyoid, Parotideal, and Retropharyngeal Glands; Intestines.—Normal.

Mesenteric Glands.—In the cortex of one mesenteric gland there was a calcareous tubercle.

Ileo-colic Glands.—Two ileo-colic glands showed in the cortex scattered calcareous tubercles irregular in outline.

Various Lymphatic Glands.

Precrural, Popliteal, Gluteal, Ischiatic, Pudic.—Normal.

PIG 91. Virus H. 87. "W.D."

Subcutaneous inoculation of culture derived from the human suprarenal body through a guinea-pig.

Dose—50·0 milligrammes.

Date of Inoculation—July 3, 1907. [Age 5½ months.]

Killed when in good health—October 11, 1907. [100 days after inoculation.]

Clinical Notes.

The pig remained in good health during the experiment, and grew normally.

Temperature.—On the fifth day after inoculation the temperature rose to 40·0° C. The following day it was normal, and it remained approximately normal until the pig was killed three months later; the maximum range of variation in the temperature during this period was 1·4° C. (37·8° C.–39·2° C.).

Tuberculin Test.—The pig was not tested subsequent to inoculation.

Weights.

	cwt.	qrs.	lbs.
July 3, 1907	1	0	8
October 11, 1907	1	2	21

Total gain of weight.—2 qrs. 13 lbs.

Average rate of gain per week.—5 lbs.

POST-MORTEM EXAMINATION.

The carcass was fat.

Local Lesion.—In the subcutaneous tissues on the left side of the abdomen on a level with the umbilicus there was a hemispherical cyst with haemorrhagic fibrous walls and soft caseous pultaceous contents.

Superficial Inguinal Glands.—Three on the left side, not enlarged, contained discrete softened caseous slightly gritty nodules ranging in size from a pin's head to that of a wheat grain.

The right inguinal glands were normal.

Precrural Glands.—The left contained about a dozen caseous tubercles, the largest the size of a pin's head. The right was normal.

Abdomen.

Omentum and Peritoneum, Spleen, Liver and Portal Glands, Kidneys and Suprarenals, Renal, Lumbar, and Iliac Glands.—Normal.

Thorax.

Pleura, Heart, Bronchial and Mediastinal Glands.—Normal.

Lungs.—The lungs were perfectly normal in general appearance. Just under the pleura, about the middle of the dorsal surface of the right caudal lobe, there was a group of about twelve nodules ranging from 1 to a little more than 2 mm. in diameter; the majority had caseous gritty centres, the rest were translucent throughout; in the rest of the right lung four caseous gritty tubercles were seen, the largest the size of a millet seed.

On the dorsal surface of the left caudal lobe there was a group of four translucent grey nodules and elsewhere one or two grey tubercles of a doubtful nature.

No nodules were seen in the depth of the lung.

Alimentary Tract.

Tongue, Pharynx, Palate, Tonsils; Submaxillary and Retropharyngeal Glands; Intestines and Mesenteric Glands.—Normal.

Various Lymphatic Glands.

Cervical, Prescapular, Prepectoral, and Popliteal.—Normal.

Microscopical Examination.

Nodule from Right Lung.—No tubercle bacilli seen.

Nodule from Left Lung.—No tubercle bacilli seen.

PIG 95. Virus H. 87. "W.D."

Subcutaneous inoculation of culture derived from the human suprarenal body through a guinea-pig.

Dose—40·0 milligrammes.

Date of Inoculation—July 3, 1907. [Age 5½ months.]

Killed when in good health—October 15, 1907. [104 days after inoculation.]

Clinical Notes.

The pig showed no sign of ill health during the experiment, and grew normally.

Temperature.—The temperature was approximately normal throughout, the highest temperatures recorded being 39·6° C. on the 5th day and 39·7° C. on the 90th day, and the lowest 38·0° C. on the 77th day.

Tuberculin Test.—The pig was not tested subsequent to inoculation.

Weights.

	cwt.	qrs.	lbs.
July 3, 1907	1	0	16
October 15, 1907	1	3	11

Total gain of weight.—2 qrs. 23 lbs.

Average rate of gain per week.—5·3 lbs.

POST-MORTEM EXAMINATION.

The carcass was fat.

Local Lesion.—In the subcutaneous tissues of the right flank on a level with the umbilicus there was a soft pultaceous caseous mass, surrounded by a thin fibrous capsule, measuring 3 by 2·5 by 1·5 cm.

Inguinal Glands.—The inguinal glands on the right side contained altogether about half a dozen soft caseous gritty nodules, the largest the size of a wheat grain.

The left inguinal glands were normal.

Precrural Glands.—The right precrural gland showed scattered nodules similar to those in the inguinal glands.

The left precrural gland was normal.

Ventral Mediastinal Glands.—The one on the right side was a little enlarged and contained a small number of discrete caseo-calcareous tubercles, the largest the size of a millet seed. That on the left was normal.

Abdomen.

Omentum and Peritoneum; Spleen, Liver and Portal Glands; Kidneys and Suprarenal Bodies; Renal, Lumbar and Iliac Glands.—Normal.

Thorax.

Pleura, Heart, Bronchial and Dorsal Mediastina Glands.—Normal.

Lungs.—The lungs were perfectly normal in general appearance; in each caudal lobe under the pleura there was a greyish homogeneous nodule 2 mm. in diameter (parasitic); otherwise the lungs were normal.

Alimentary Tract.

Tongue, Pharynx, Tonsils.—Normal.

Submaxillary, Retro-pharyngeal and Parotideal Glands, Intestines, Mesenteric Glands.—Normal.

Various Lymphatic Glands.

Cervical, Prescapular, and Prepectoral Glands.—Normal.

Microscopical Examination.

Nodule from Lung.—No tubercle bacilli.

Tubercle from Right Precrural Gland.—Tubercle bacilli numerous.

VIRUS H. 88. "E.L."

PRIMARY ABDOMINAL TUBERCULOSIS.

VIRUS H. 88. "E.L."

(May 2, 1907.)

CULTURE INOCULATIONS.

MESENTERIC GLANDS.

JULY 27, 1907.

The strain was derived from the human mesenteric glands, and had been in artificial cultivation a total period of 85 days.

The culture used was the 6th generation, 21 days old.

CALF 1271.

Subcutaneous.
Dose : 50·0 mg.
Died : Sept. 10, 1907.
45 days.

P.M. — General tuberculosis, severe.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1398	Intrav.	1·0 mg.	D. 13 days	G.T.
1399	Intrav.	0·1 mg.	D. 25 „	G.T.
1400	Intrap.	1·0 mg.	D. 15 „	G.T.
1401	Intrap.	0·1 mg.	D. 27 „	G.T.
1402	Subcut.	50·0 mg.	D. 50 „	G.T.
1403	Subcut.	10·0 mg.	D. 9 „	The cause of death was not ascertained. The organs and glands appeared normal.

GUINEAPIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
2510	Intrap.	0·1 mg.	D. 28 days	G.T. Injection partly subperitoneal.
2511	Subcut.	0·1 mg.	D. 40 „	G.T.

CALF 1271. Virus H. 88. "E.L."

Subcutaneous inoculation of culture derived from the original material (mesenteric glands).

Dose—50·0 milligrammes.

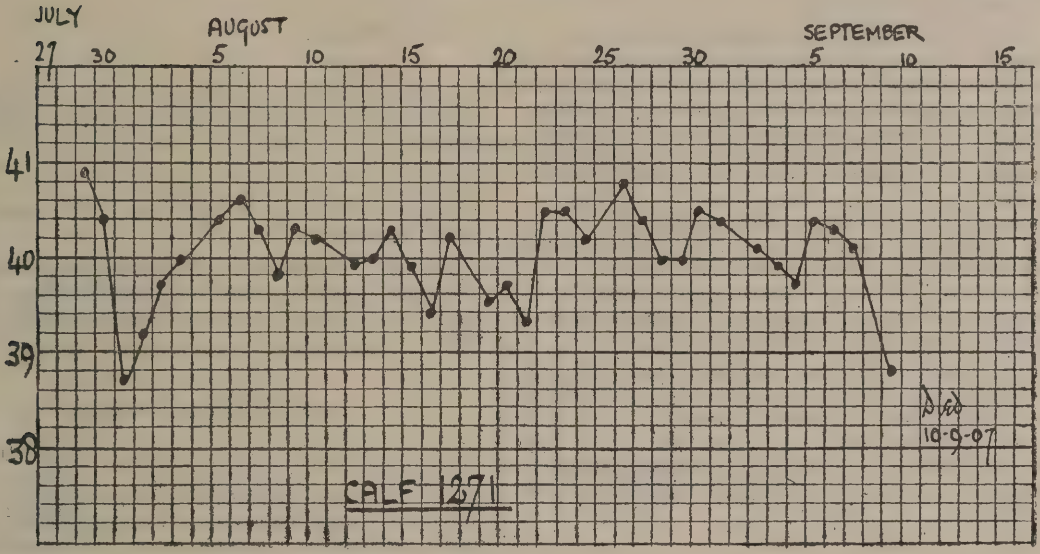
Date of Inoculation—July 27, 1907. [Age 16 weeks.]

Died—September 10, 1907. [45 days after inoculation.]

Clinical History.

The course of the disease was similar to that usually seen in calves suffering from acute tuberculosis.

Temperature.



Tuberculin Test.—The calf was not tested subsequent to inoculation.

Weights.

	cwt.	qrs.	lbs.
July 27, 1907	1	2	4
September 10, 1907	1	0	15

Total loss of weight.—1 qr. 17 lbs.

Average rate of loss per week.—7 lbs.

POST-MORTEM EXAMINATION.

The carcass was emaciated.

Local Lesion.—At the seat of inoculation, in front of the left shoulder, there was a large firm tumour measuring 15 by 13 by 6 cm. and weighing 1 lb. 8 oz.; it was attached to the adjacent glands by very thick caseous cords surrounded by fibroid muscular tissue infiltrated with caseous nodules, and had a flat tongue-shaped extension from its inferior border into the loose tissues of the neck; on section it was composed of pinkish yellow juicy caseo-necrotic tissue which infiltrated both the skin and muscles, the latter very deeply; there was considerable oedema around the tumour.

Left Prescapular Gland.—The left prescapular gland weighed 14 oz. and measured 13 by 8 by 6 cm.; on section it was composed almost throughout of dense pinkish yellow caseous substance showing here and there foci of early calcification; the capsule was much thickened and the muscles all around it tightly adherent to it and in places infiltrated with caseous nodules.

Prepectoral Glands.—On the left side one measured 4·5 by 3·5 by 3 cm. and was dense and caseous throughout; another about half the size was deeply congested and showed in the cortex a caseating patch and numerous discrete caseous tubercles; a smaller gland contained discrete caseous nodules.

On the right side there were three slightly enlarged congested glands, beset with discrete caseous nodules.

Right Prescapular Gland.—The right prescapular gland measured 5·5 by 2·5 by 1·2 cm. and showed on section fairly numerous discrete caseous nodules, the largest 2 mm. in diameter.

Cervical Glands.—One on the left side showed the cortex in a state of early caseation; the others contained discrete caseous nodules.

Just within the entrance to the thorax on the left side there was a large firm gland composed of grey tissue closely mottled with irregular caseous areas; a thickened caseous lymphatic vessel entered the hilum of this gland.

Thorax.

Pleura.—On the costal pleura there were about a dozen flattened caseous nodules, the largest 8 mm. in greatest diameter; the lymphatic fringes along the margins of the ribs were congested and slightly hypertrophied. There were several caseous nodules on the pericardial pleura.

Lungs.—The lungs were very large, deeply congested, and very heavy (weight 8 lbs. 14 ozs.); the anterior lobes and almost the whole of the caudal lobes were firm and quite airless, pieces sinking in water; the dorsal portions of the caudal lobes were air-containing to some extent, frothy blood-stained oedema fluid exuding on pressure. The lung parenchyma was very closely beset with caseous nodules varying up to 3 and 4 mm. in diameter; here and there were some larger nodules formed by the coalescence of smaller ones.

Thoracic Glands.—The bronchial and dorsal mediastinal glands were much enlarged, weighing together 6½ ozs.; on section the cortices were composed mainly of firm grey or reddish-grey tissue, beset with irregular yellow caseous nodules; the medullary portions were deeply congested.

The trachea and bronchi were filled with frothy fluid and mucus.

Heart.—Pericardium and muscle normal. There was well-marked atheromatous degeneration of the endocardium of the left ventricle and the left auricle; there were a few small patches of atheroma in the right auricle; the valves were unaffected; no tubercles were seen.

Abdomen.

Omentum.—The ventral surface of the omentum was rather closely studded with firm congested caseous nodules, the largest measuring 1 by 0·6 cm., some loosely pedunculated.

Parietal Peritoneum.—On the left side there was a small group of nodules similar to those on the omentum, and one on the lower part of the diaphragm; on the central tendon there were several small grey tubercles, slightly raised above the surface.

Spleen.—The spleen was distinctly enlarged and weighed 1 lb. 1 oz.; on the surface there were three flattened caseous nodules; the pulp was very closely beset with yellow caseous tubercles varying in diameter from 1·5 to 2 mm.

Liver.—The liver was enlarged, pale and soft; it showed on the surface numerous nodules; some of these were slightly raised, flattened, and had overhanging margins, others were attached by narrow pedicles (the largest measured 8 mm. in diameter), but the majority were situated just under the capsule and projected either only slightly or not at all.

On section the substance was closely and evenly beset with caseating nodules with grey margins, varying from 1 to about 3 mm. in diameter.

Portal Glands.—The portal glands were much enlarged and closely beset with caseous nodules occurring singly and in confluent groups.

Gall-bladder.—The mucous membrane of the gall-bladder showed numerous small ulcers, each covered with a small projecting mass of mucus.

Kidneys.—Each kidney showed in the cortex near the surface from 14 to 16 caseous nodules, the largest 2·5 mm. in diameter; a few similar nodules were seen in the depth.

Suprarenal Bodies.—Normal.

Alimentary Tract.

Pharynx.—The corrugated mucous membrane in the vault of the pharynx was closely beset with caseous nodules, and there were a few under the mucous membrane around the base of the tongue.

Tonsils.—The tonsils showed a number of caseous nodules similar to those in the lymphatic glands.

Intestines.—In the Peyer's patches, as well as under the mucous membrane, there were fairly numerous caseous tubercles, some ulcerated; on the serous surface opposite two of these tubercles there was a prominent congested caseous nodule.

There were numerous submucous caseous nodules in the large intestine.

Gastric, Mesenteric, and Colic Glands.—All contained rather numerous caseous nodules, in some large and confluent.

Eyes.—Normal.

Mamma.—The mammary gland tissue contained a number of caseous nodules, the largest 3 mm. in diameter.

Larynx.—There were some ulcerated caseous foci on the vocal chords.

Trachea.—The mucous membrane along the whole length of the trachea showed numerous small ulcers with slightly raised congested margins and yellow floor.

Various Lymphatic Glands.

Precrural and Popliteal, Axillary, Pudic, Gluteal and Ischiatic, Submaxillary and Retropharyngeal, Parotideal, Ventral Mediastinal, Lumbar and Iliac.—All these glands were slightly enlarged and closely beset with discrete caseous nodules, the largest about 2 mm. in diameter, each showing in the centre an opaque focus (?) of beginning calcification.

Renal.—The renal gland was much enlarged and beset with rather large caseous nodules.

VIRUS H. 89. "W.I."

PRIMARY ABDOMINAL TUBERCULOSIS.

VIRUS H. 89. "W.I."

(June 12, 1907.)

CULTURE INOCULATIONS.

MESENTERIC GLAND.

August 20, 1907.

The strain was derived from a human mesenteric gland direct, and had been in artificial cultivation a total period of 69 days.

The culture used was the 5th generation, 22 days old.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1477	Intrav.	1·0 mg.	D. 10 days	G.T. acute.
1478	Intrap.	1·0 mg.	D. 112 ,,	G.T. Injection mainly into the stomach.
1479	Subcut.	10·0 mg.	D. 39 ,,	G.T.
1480	Subcut.	10·0 mg.	D 30 ,,	G.T. and coccidiosis of liver.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
2576	Intrap.	1·0 mg.	D. 16 days	G.T. Injection partly subcutaneous.
2577	Subcut.	1·0 mg.	D. 71 ,,	G.T.

VIRUS H. 89. " W.I."—*continued.*

CULTURE INOCULATIONS—*continued.*

LUNG.

OCTOBER 25, 1907.

The strain was derived from the human lung through G.P. 2474, and had been in cultivation a total period of 123 days.

The culture used was the 7th generation, 21 days old.

CALF 1275.

Subcutaneous.

Dose : 50·0 mg.

Killed (when well) : Feb. 7, 1908.

105 days.

P.M.—General tuberculosis of moderate severity

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1545	Intrav.	0·1 mg.	D. 22 days	G.T.
1546	Intrap.	0·1 mg.	D. 36 „	G.T.
1547	Subcut.	3·3 mg.	D. 34 „	G.T.
1548	Subcut.	1·0 mg.	D. 10 „	Organs appeared healthy; no obvious cause for death.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
2639	Intrap.	0·1 mg.	D. 16 days	Acute G.T.
2640	Subcut.	0·1 mg.	D. 59 „	G.T.

LUNG.

JANUARY 18, 1908.

The strain was derived from the human lung through G.P. 2474, and had been in cultivation a total period of 208 days.

The culture used was the 13th generation, 21 days old.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1684	Subcut.	10·0 mg.	D. 29 days	Acute G.T.
1685	Subcut.	10·0 mg.	D. 52 „	G.T.

CALF 1351.

Subcutaneous.

Dose : 50·0 mg.

Killed when dying : March 2, 1908.

44 days.

P.M.—General tuberculosis, severe.

CALF 1275. Virus H. 89. "W.I."

Subcutaneous inoculation of culture derived from the human lung through Guinea-pig 2474.

Dose—50·0 milligrammes.

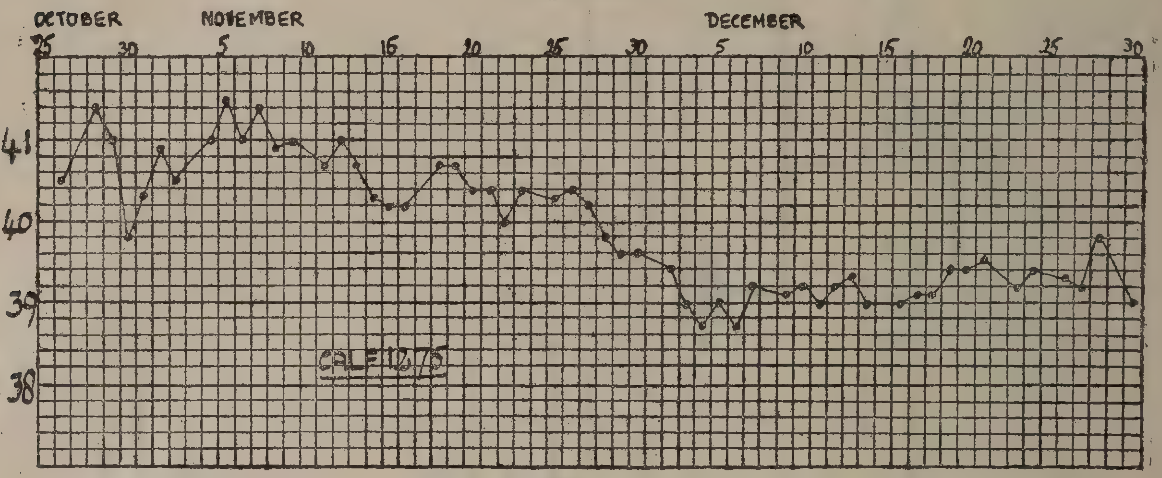
Date of Inoculation—October 25, 1907. [Age about 4½ months.]

Killed when in good health—February 7, 1908. [105 days after inoculation.]

Clinical Notes.

During November the calf was unwell and looked thin. Its general health was greatly improved during December, and during January it grew normally and appeared to be in very good health; it was in good condition when killed.

Temperature.



From December 30 to February 7 the temperature was normal.

Weights.

	cwt.	qrs.	lbs.
October 25, 1907	1	3	11
February 7, 1908	2	1	7

Total gain of weight.—1 qr. 24 lbs.

Average rate of gain per week.—3·4 lbs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—At the seat of inoculation in the subcutaneous tissues there was a firm tumour measuring 6 by 6 by 2 cm.; it was composed of a mass of dense yellow caseated substance gritty around the margins, surrounded by a wall of fibrous tissue 5 mm. thick; this wall was adherent to the skin, which was much thickened and beset with calcareous tubercles with brownish translucent margins.

Left Prescapular Gland.—The left prescapular gland measured 9·5 by 5 by 4·5 cm. and weighed 5 ozs.; on section about three-quarters of the gland substance was dense and caseous and gritty around the margins; nearly the whole of the rest of the gland was beset with calcareous coalescing tubercles.

Right Prescapular Gland.—The right prescapular gland measured 4 by 2 by 1 cm., and showed in the cortex a few calcareous tubercles and two hempseed-sized softened caseous nodules.

Prepectoral Glands.—On the left side there were three enlarged glands; the largest measured 2 cm. in greatest diameter, the others were smaller; the former was dense and caseous practically throughout; the latter contained a few calcareous tubercles and many minute opaque points.

On the right side the glands contained a few discrete calcareous tubercles.

Cervical Glands.—The cervical glands contained a varying number of calcareous tubercles.

Thorax.

Parietal Pleura.—Along the margins of the ribs there were incomplete lines of firm pinkish fleshy tuberculous growths.

There were similar growths on the pleura coverng the pericardium.

Heart.—The pericardium over the great vessels showed a few tuberculous growths. In the muscle of the left ventricle there was a pea-sized homogeneous grey nodule which projected slightly from the surface. Otherwise the heart was normal.

Lungs.—The surfaces of the anterior lobes and of the posterior, with the exception of the posterior and dorsal portions which showed only a few, were covered with small flat pinkish growths; there were similar growths in the fringes around the margins of the lobes; the left anterior lobe had around its posterior margin a continuous fringe of firm pinkish tuberculous tissue 5 mm. broad.

The lung parenchyma was crepitant and contained fairly numerous evenly distributed grey tubercles varying in size up to that of a millet seed; many of the smaller tubercles were homogeneous and barely visible to the naked eye, the rest had calcareous centres.

Thoracic Glands.—The dorsal mediastinal and bronchial glands together weighed 8 oz.; the long posterior mediastinal measured 16 cm. in length. On section they were much firmer than normal, and showed in the cortex, mainly in the outer part, calcareous miliary tubercles aggregated together here and there into groups; elsewhere the gland tissue was infiltrated with minute yellow points and very fine yellow streaks (no tubercle bacilli were found in a smear preparation from the latter).

The ventral mediastinal glands contained one or two calcareous tubercles.

Diaphragm.—On the pleural surface and on the peritoneal surface on the right side there were large and small plaques of tuberculous growths, similar to those on the suspensory ligament of the liver.

Larynx and Trachea.—Normal.

Abdomen.

Omentum.—On the ventral surface there was a number of flattened loosely attached pinkish growths, homogeneous throughout.

Peritoneum.—The parietal peritoneum was normal.

Spleen.—The spleen was enlarged, and weighed 1 lb. 4 ozs. It showed on the surface several flattened pinkish growths of various sizes similar to those on the omentum.

The pulp was very closely beset with nodules with grey margins and yellow calcareous centres ranging from 2 to 4 mm. in diameter.

Liver.—On the convex surface there were numerous flattened greyish growths with a coarsely granular surface varying in size up to 1·5 cm. in diameter; most of them appeared to have grown from tubercles in the substance; the falciform ligament was covered with plaques of similar tuberculous tissue. There were a few similar growths on the concave surface. Just under the capsule of the liver fairly numerous pearly grey nodules, some projecting, ranging up to 3 mm. were seen; on section they had a lenticular outline.

In the depth of the liver there were evenly distributed though not very numerous grey tubercles varying in size up to 1·5 mm.; the largest were slightly opaque in the centre.

Portal Glands.—The portal glands were slightly enlarged and contained fairly numerous discrete miliary calcareous tubercles.

Gall-bladder.—Normal.

Kidneys.—In the cortex of each kidney there were fairly numerous submiliary grey tubercles and a few millet-seed sized grey tubercles with minute opaque centres not perceptibly gritty.

Suprarenal Bodies.—Normal.

Coeliac Glands.—The coeliac glands contained a moderate number of highly calcareous discrete miliary tubercles.

Alimentary Tract.

Tongue, Pharynx, Tonsils.—Normal.

Intestines.—All the Peyer's patches contained calcareo-caseous tubercles, the mucous membrane over some of which was ulcerated; the tubercles in some of the patches were very numerous.

The large intestine was normal.

Mesenteric Glands.—All the mesenteric glands contained scattered calcareous tubercles.

Testicles.—Normal.

Eyes.—There was a minute grey tubercle at the junction of the choroid and the ciliary body in the left eye. The right was normal.

Peripheral Lymphatic Glands.—All the peripheral glands (with the exception of those already described) contained a varying number, in no case large, of calcareous miliary tubercles; here and there was seen a hempseed-sized soft caseous nodule similar to those in the right prescapular gland.

Microscopical Examination.

Tubercle from the Eye.—A few tubercle bacilli were seen.

Scraping from a portion of a Thoracic Gland showing very fine streaks and points.—No tubercle bacilli were seen.

CALF 1351. Virus H. 89. "W.I."

Subcutaneous Inoculation of culture derived from the human lung through Guinea-pig 2474.

Dose—50·0 milligrammes.

Date of inoculation—January 18, 1908. [Age 6 weeks.]

Killed when dying—March 2, 1908. [44 days after inoculation.]

Clinical Notes.

The course of the disease was similar to that usually seen after the inoculation of 50·0 mg. of a virulent virus.

Temperature.

On the sixth day after inoculation the temperature rose to 40·8° C. and it reached a maximum of 41·1° C. on the 13th day. From the 13th to the 33rd day the temperature remained high (between 39·6° C. and 40·5° C.); from the 34th to the 44th day the temperature slowly fell; it was 38·5° C. when the calf was killed on the 44th day.

Tuberculin Test.

The calf was not tested subsequent to inoculation.

Weights.

	qr.	lbs.
January 18, 1908	3	18
March 2, 1908	3	3

Total loss of weight.—15 lbs.

POST-MORTEM EXAMINATION.

The carcass was emaciated.

Local Lesion.—At the seat of inoculation there was a large firm tumour measuring 19 by 10 by 5·5 cm.; the tissues in its neighbourhood were very oedematous.

On section it was composed of a layer of firm salmon-pink caseo-necrotic tissue 2·5 cm. in greatest thickness, and a layer of muscular tissue closely infiltrated with irregular coalescing caseating nodules to a depth of 2·6 cm.; the overlying skin was similarly infiltrated.

Left Prescapular Gland.—The left prescapular gland was much enlarged, measuring 9·5 by 5·2 by 4·8 cm., and weighing 6 ozs. On section it was composed throughout of firm caseo-necrotic tissue. The capsule was slightly thickened.

Right Prescapular Gland.—The right prescapular gland measured 4·3 by 2 by 1 cm. It was oedematous and showed small scattered discrete caseating nodules.

Prepectoral Glands.—The kidney-shaped gland on the left side was much enlarged (3·5 by 2·3 cm.) and oedematous, and its cortex was infiltrated with a network of caseating tissue. Two other pea-sized glands on the left side were caseating throughout.

The right prepectoral glands were enlarged and oedematous and showed caseating nodules in the cortex.

Cervical Glands.—The left mid-cervical gland, the size of a filbert, was dense and caseating throughout. Other left cervical glands contained discrete caseating nodules.

Thorax.

Pleura.—The fringes on the borders of many of the ribs on the right side were hypertrophied and contained minute opaque foci; in the fringes bordering the 7th, 9th and 10th ribs, half-a-dozen flattened caseating tubercles were seen, the largest 4 mm. in diameter. The costal pleura on the left side was but little affected. On the diaphragmatic and pericardial pleura there were hypertrophied tufts and flattened tubercles similar to those on the costal pleura.

Lungs.—The lungs were firm, heavy and weighed 4 lbs. 3 ozs. Their surfaces were mottled with irregular dark red areas of congestion, and were everywhere evenly beset with numerous yellowish tubercles and nodules frequently confluent, forming small irregular patches; the tubercles were about 1–2 mm., the patches frequently measured 4–6 mm. in diameter.

On section confluent yellow caseating tubercles were seen to be very thickly distributed throughout the lungs; the congested areas were more extensive and the tubercles slightly more numerous in the anterior than in the posterior lobes. The fringes were hypertrophied and showed in places small caseating tubercles.

Thoracic Glands.—The thoracic glands were much enlarged; the long posterior mediastinal gland measured 12 by 4·5 by 1·7 cm. On section their cortices were thickened and composed of firm tissue closely infiltrated with a caseous network, and their medullae were congested and oedematous.

Heart.—A few very minute translucent tubercles were seen projecting from the endocardium of the right auricle, and four pinhead yellowish-white tubercles were seen in the ventricle. The left side of the heart was normal.

Trachea.—The mucous membrane showed four slightly raised congested caseous nodules ulcerated on the surface.

Abdomen.

Omentum.—The omentum showed lines and patches of hypertrophied villous tufts, many of which contained yellow opaque points, and there were numerous loosely attached yellow caseating nodules up to 7 mm. in diameter.

Peritoneum.—Normal.

Spleen.—The spleen was very large, weighing 14 ozs. On section it was very firm and was packed as closely as possible with yellow caseating tubercles, the largest measuring 4 mm. in diameter.

Liver.—The liver showed everywhere on the surface numerous flat yellowish-white tubercles projecting very slightly and measuring from 1· to 3· or 4· mm. in diameter; a few of the larger ones had slightly overhanging margins. Many other tubercles were dimly seen through the capsule.

On section very numerous yellowish-white tubercles, the largest 2· mm. in diameter, were evenly distributed throughout (14 were counted in a square centimetre).

Portal Glands.—The portal glands were much enlarged and very oedemateous and were infiltrated with confluent caseating tubercles.

Kidneys.—The right kidney was pale and showed on the surface groups and patches of small confluent yellow tubercles, some projecting, others dimly seen through the capsule. One patch was uniformly yellowish-white in colour, and measured 2·5 cm. in diameter; about ten large patches were seen, some of which extended irregularly and diffusely over an entire lobule; these patches were irregularly congested. Elsewhere there were isolated grey tubercles with caseous centres, the largest about 2 mm. in diameter. On section the yellow tubercles and patches were seen to extend through the cortex, which was therefore in places entirely composed of yellow softened tissue.

No tubercles were seen in the medulla; the hilum of the kidney was very oedematous.

The left kidney was similarly but less severely affected. One small lobule of the right kidney was bright pink in colour (the medulla being red) and peppered on the surface with irregular opaque foci.

A smear from the soft yellow patches showed numerous bacilli stained blue and no acid-fast bacilli; a smear from a single greyish-white tubercle showed numerous tubercle bacilli. The yellow patches and foci were probably therefore the result of infection with organisms other than the tubercle bacillus.

Suprarenal Bodies.—The right showed three yellow pinhead-sized tubercles in the cortex, the left two.

Renal, Lumbar and Iliac Glands.—All contained numerous discrete caseating nodules similar to those in the peripheral glands.

Alimentary Tract.

Tongue.—There were several small superficial ulcers in the mucous membrane at the sides and base of the tongue; they showed no sign of caseation on section.

Tonsils.—Each contained several caseous nodules the largest 4 mm. in diameter.

Intestines.—There were numerous caseous nodules up to a hempseed in size in the Peyer's patches of the small intestine, as well as under the mucous membrane; the mucous membrane over many of the nodules was ulcerated.

Under the mucous membrane of the large intestine scattered caseous nodules were seen, smaller in number and size than in the small intestine.

Mesenteric and Ileo-Colic Glands.—All contained numerous caseating tubercles, mostly discrete but occasionally confluent.

Gastric Glands.—The gastric glands were enlarged and contained shot-sized caseous tubercles.

Peripheral Lymphatic Glands.—All the peripheral lymphatic glands contained numerous discrete caseating nodules varying in size up to 3 mm., the majority being about 2 mm.

Microscopical Examination.

Smear from a single grey Tubercle from the Kidney.—Tubercle bacilli numerous.

Smear from soft yellow patch in Kidney.—No tubercle bacilli; numerous bacilli stained blue.

Scraping from floor of Ulcer on the Tongue.—A few tubercle bacilli and numerous other organisms stained blue.

VIRUS H. 90. "I.P."

PRIMARY ABDOMINAL TUBERCULOSIS.

VIRUS H. 90. "I.P."

(August 3, 1907.)

CULTURE INOCULATIONS.

RETRO-PERITONEAL GLAND.

I.—NOVEMBER 5, 1907.

The strain was derived from the human retro-peritoneal gland, and had been in artificial cultivation a total period of 94 days.

The culture used was the 8th generation, 14 days old.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
2669	Intrap.	1·0 mg.	D. 29 days	G. T.
2670	Subcut.	1·0 mg.	D. 85 „	G. T.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1551	Intrav.	1·0 mg.	D. 26 days	G. T.
1552	Intrav.	0·1 mg.	D. 79 „	T. of lungs and kidneys.
1553	Subcut.	10·0 mg.	K. 111 „	G. T.
1554	Subcut.	10·0 mg.	K. 111 „	G. T.

II.—NOVEMBER 14, 1907.

The strain was derived from the human retro-peritoneal gland, and had been in cultivation a total period of 103 days.

The culture used was the 10th generation, 14 days old, on glycerin-serum.

GOAT 55.

Subcutaneous.

Dose : 50·0 mg.

Killed : February 25, 1908.

103 days.

P.M.—Small local lesion. Left prescapular gland contained caseous gritty nodules. The lungs showed fairly numerous small grey fibrous tubercles ; each kidney contained one tubercle. In most of the mesenteric glands there were soft yellow gritty tubercles and patches. The left quarter of the udder contained a number of fibrous tubercles with caseous centres and two hard nodules with caseous foci. The right showed a small firm patch beset with caseous points. Supramammary lymph-glands normal.

RETRO-PERITONEAL GLAND.

III.—MARCH 30, 1908.

The strain was derived from the same source and had been in cultivation a total period of 240 days.

The culture used was the 16th generation, 13 days old.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1793	Intrav.	1·0 mg.	D 32 days	G. T.
1794	Intrav.	0·1 mg.	D. 64 „	G. T.
1795	Intrav.	0·01 mg.	D. 116 „	G. T.

CULTURE INOCULATIONS—*continued.*

RETRO-PERITONEAL GLAND.

IV.—JULY 8, 1908.

The strain was derived from the same source and had been in cultivation a total period of 340 days.

The culture used was the 21st generation, 16 days old.

CALF 1383.

Subcutaneous.
Dose : 50·0 mg.
Killed :
October 8, 1908.
92 days.

P.M. — General tuberculosis, progressive but not severe.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1923	Subcut.	10·0 mg.	K. 296 days	Slight G. T.
1924	Subcut.	10·0 mg.	K. 296 ,,	Chronic general progressive T.

CALF 1471.

Subcutaneous.
Dose : 80·0 mg.
Killed : October 6, 1908.
90 days.

P.M.—Slight progressive tuberculosis.

Small ulcerated tumour seat of inoculation. Scattered caseo - purulent nodules in adjacent glands. About half - a - dozen "perlsucht" growths up to 8 mm., the majority in an early stage, were seen in the surface of the lungs ; in the substance were scattered small reddish nodules. The spleen contained a dozen gritty tubercles, the thoracic glands scattered calcareous tubercles.

MESENTERIC GLANDS.

MARCH 17, 1908.

The strain was derived from the human mesenteric glands through Guinea-pig 2522 (sternal gland).

The culture used was the 10th generation, 13 days old. Total duration of artificial cultivation, 208 days.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1773	Intrav.	1·0 mg.	D. 15 days	Acute T.
1774	Intrav.	0·1 mg.	K. 209 ,,	T. of lungs, kidneys, and mamma.
1775	Subcut.	50·0 mg.	K. 209 ,,	Local lesion only.
1776	Subcut.	15·0 mg.	K. 209 ,,	Local lesion and a few tubercles in lungs.

CALF 1383. Virus H. 90. "I.P."

Subcutaneous inoculation of culture derived from the human retro-peritoneal gland direct.

Dose—50·0 milligrammes.

Date of Inoculation—July 8, 1908. [Age about 17 weeks.]

Killed when in good health—October 8, 1908. [92 days after inoculation.]

Clinical Notes.

The calf remained well during the experiment.

Temperature.

A period of slight and irregular pyrexia set in on the 7th day after inoculation and lasted thirty-two days; the maximum temperature recorded during this period was 40·1° C., the minimum 38·5° C. Subsequently the temperature was normal.

Weights.

	cwt.	qrs.	lbs.
July 8, 1908	1	1	22
October 8, 1908	1	2	18

Total gain of weight.—24 lbs.

Average rate of gain per week.—1·9 lbs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—On the left side of the neck there was a prominent fluctuating swelling measuring 13 by 8·5 by 5·5 cm.; on section it was composed of caseous breaking-down masses and light-brownish ill-formed pus.

Left Prescapular Gland.—The left prescapular gland measured 7 by 4·5 by 3·5 cm. and showed more than three-quarters of its substance dense caseous and gritty.

At the inferior extremity of the above gland there was a gland the size of a thrush's egg which was caseous throughout and gritty from calcification.

Left Prepectoral Glands.—One gland resembled the caseous prescapular gland; another contained a few calcareous tubercles.

Right Prescapular Gland.—The right prescapular gland measured 4 by 2 by 1 cm. and showed on section two caseous nodules the largest the size of a hemp seed, surrounded by a fibrous wall.

Right Prepectoral Glands.—Normal.

Cervical Glands.—One of the lower cervical glands on the left side was beset with discrete calcareous tubercles; the rest were normal.

Thorax.

Pleura.—Normal.

Lungs.—The lungs contained fairly numerous evenly distributed shotty nodules ranging in diameter from 2 to 5 mm.; they were dense caseous and gritty and had fibrous margins, many of those under the pleura projecting from the surface; scattered about were a few larger nodules one measuring 1·5 cm. in greatest diameter, with a lobular outline; these were also dense caseous and contained irregular calcareous particles; on the dorsal mediastinal surface of the lung were two flat reddish 'perlsucht' growths and elsewhere a few others in an early stage of formation. The fringes around the margins of the lungs and along some of the interlobular septa were slightly hypertrophied.

Thoracic Glands.—The long mediastinal gland was enlarged (about twice the normal) and showed in the cortex moderately numerous yellow calcareous tubercles and small nodules composed of groups of tubercles; there were similar tubercles in some of the other mediastinal glands and the bronchial glands but in much smaller number.

Heart.—Normal.

Abdomen.

Omentum and Peritoneum.—Normal.

Spleen.—The spleen contained a moderate number of spherical nodules evenly distributed throughout the pulp; they were firm, yellow, caseous and gritty, and had grey fibrous margins; they varied from 2 to 4 mm. in diameter. Fifty-five were counted on one longitudinal cut surface.

Liver.—In the substance of the liver just under the capsule there were a dozen caseo-calcareous nodules with fibrous margins, the largest about the size of a hemp seed; similar nodules were scattered throughout the substance.

Portal Glands.—The portal glands were not enlarged; they showed in the cortices scattered calcareo-caseous tubercles, the largest the size of a millet seed.

Kidneys.—In the cortex of one kidney there was a millet-seed sized caseous gritty tubercle with a fibrous capsule; in that of the other there was a similar but smaller tubercle.

Suprarenal Bodies.—Normal.

Coeliac Glands.—The coeliac glands were not enlarged; one contained discrete calcareo-caseous tubercles the size of millet seeds, the rest were normal.

Renal, Lumbar, and Iliac Glands.—Normal.

Alimentary Tract.

Tongue, Pharynx, Tonsils; Submaxillary, Retropharyngeal and Parotideal Glands; Intestines.—Normal.

Mesenteric Glands.—The mesenteric glands contained two calcareo-caseous tubercles and a patch 1 cm. in diameter composed of aggregated calcareous tubercles.

Ileo-Colic Glands.—One contained a number of yellow calcareous tubercles; another contained a single tubercle; the rest were normal.

Testicles.—Normal.

Various Lymphatic Glands.

Precrural Glands.—The left precrural gland contained a yellow caseous nodule the size of a wheat grain; the right was normal.

Popliteal, Gluteal, and Ischiatic Glands.—Normal.

Pudic Glands.—One pudic gland contained a hemp-seed-sized caseous nodule.

Microscopical Examination.

Emulsion of Nodule from Pudic Gland.—A few tubercle bacilli seen.

Emulsion of Nodule from Lung.—Two tubercle bacilli seen.

Emulsion of Tubercle from Spleen.—One tubercle bacillus seen.

Animals Inoculated.

Guinea-pig 3322 was inoculated intraperitoneally with an emulsion made from a lung nodule; and Guinea-pig 3321 intraperitoneally with an emulsion made from a spleen tubercle. The dose in each case was small. The former died in 58 days of general tuberculosis, the latter died in 134 days and showed chronic and not very severe general tuberculosis.

CALF 1471. Virus H. 90. "I.P."

Subcutaneous inoculation of culture derived from the human retro-peritoneal gland direct.

Dose—80·0 milligrammes.

Date of Inoculation—July 8, 1908. [Age about 6 months.]

Killed when in good health—October 6, 1908. [90 days after inoculation.]

Clinical Notes.

The calf remained well during the experiment.

Temperature.

There were two short periods of pyrexia; one commenced on the 6th day and lasted four days (maximum 39·8°C.); the second commenced on the 27th day and continued intermittently for ten days (maximum 40·0° C.). With these exceptions the temperature was perfectly normal during the experiment.

Weights.

	cwt.	qrs.	lbs.
July 8, 1908	2	2	11
October 6, 1908	2	2	16

Total gain of weight.—5 lbs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—In the subcutaneous tissues on the left side of the neck there was a small mass 3 cm. in greatest diameter of reddish fibrous tissue containing soft yellow foci and a small irregular cavity the walls of which were lined with pus; from this cavity a small sinus led on to the skin which was covered with dried caseo-pus.

Left Prescapular Gland.—The left prescapular gland measured 6·5 by 3 by 1·8 cm. and showed in the cortex discrete yellow caseo-purulent nodules varying up to 3 mm. in diameter; at one extremity there was a moderate number of these but elsewhere they were sparsely scattered.

Right Prescapular Gland.—The right prescapular gland measured 5 by 2·3 by 1 cm. and was normal on section.

Prepectoral Glands.—Two left prepectoral glands were enlarged and moderately closely beset with nodules similar to those in the prescapular gland. Another was normal.

The right prepectoral glands were normal.

Cervical Glands.—One on the left side near the thorax contained two small caseous tubercles. Other cervical glands were normal.

Axillary Glands.—Normal.

Thorax.

Lungs.—The lungs were pink and crepitant and collapsed normally; they showed on the surface four reddish mushroomed growths ("perlsucht" growths) the largest 8 mm. in diameter; there were besides two or three small ones in an early stage growing from nodules in the parenchyma; the growths were reddish and reddish-grey throughout and showed one or two minute opaque foci not perceptibly gritty. The parenchyma of the lung showed sparsely scattered throughout irregular reddish nodules ranging up to about 3 mm. in diameter; these nodules were easily crushed and showed internally a few opaque whitish points.

Thoracic Glands.—The bronchial and mediastinal glands were normal in size; they showed however in the cortices scattered irregular calcareous tubercles, and opaque foci some not calcareous.

Heart, Pleura.—Normal.

Abdomen.

Omentum and Peritoneum.—Normal.

Spleen.—In the spleen pulp there were about a dozen tubercles; the majority were 2 mm. in diameter and had grey margins and yellow gritty centres; two were the size of pins heads and were grey and homogeneous.

Liver, Kidneys, and Suprarenal Bodies.—Normal.

Portal, Renal, Lumbar, and Iliac Glands.—Normal.

Alimentary Tract.

Tongue, Pharynx, Palate, Tonsils; Submaxillary, Retro-pharyngeal, and Parotideal Glands; Intestines, and Mesenteric Glands.—Normal.

Various Lymphatic Glands.

Precrural, Popliteal, Gluteal, Ischiatic, Pudic.—Normal.

Mammary Gland.—Normal.

Microscopical Examinations.

Emulsion of Tubercles from Prescapular Gland.—No tubercle bacilli seen.

Emulsion of Tubercles from Left Bronchial Gland.—A little group of acid-fast granules seen.

Emulsion of Pleural Nodule from Lung.—No tubercle bacilli seen.

Emulsion of Tubercles from Lung.—No tubercle bacilli seen.

GOAT 55. [Adult Female.] Virus H. 90. "I.P."

Subcutaneous inoculation of culture derived from the human mesenteric gland.

Dose—50·0 milligrammes.

Date of Inoculation—November 14, 1907.

Killed when in good health—February 25, 1908. [103 days after inoculation.]

Clinical Notes.

Three weeks after inoculation there was an elongated raised local tumour measuring 11 by about 6 cm., the margins being rather ill-defined, soft, and fluctuating. A small opening had appeared at the inferior margin of the tumour a few days previously, from which a small quantity of pus was discharged. The discharge continued intermittently and the tumour decreased considerably in size; finally the discharge ceased and the opening healed, leaving a linear scar.

The condition of the goat at the close of the period of high temperature (*see* below) was fairly good; it had not shown any symptoms of illness, and it quickly improved in condition and remained well subsequently.

Temperature.

On the second day after inoculation the temperature rose to 40·1° C. and reached a maximum of 40·5° C. on the 11th day; the temperature was raised for a total period of 29 days, after which it was quite normal.

Tuberculin Test.

February 21, 1908. [99 days after inoculation.] Reacted. Rise of temperature, 2·3° C.

Weights.

	qrs.	lbs.
November 14, 1907	3	3
February 25, 1908	3	2

Loss of weight.—1 lb.

POST-MORTEM EXAMINATION.

The goat was in good condition.

Local Lesion.—The skin on the left side of the neck showed a linear scar 7 cm. in length; on section of the skin, through the centre of the scar and at right angles to it, the subcutaneous tissues were seen to be thickened for a good distance around the scar and beset with softened yellow caseous nodules, slightly gritty from calcification, ranging in size from a millet seed to a large pea, the larger nodules being situated chiefly towards the periphery of the thickened patch.

Left Prescapular Gland.—The left prescapular gland measured 5 by 2·5 by 1·7 cm.; it contained two large nodules, one 2 cm. in diameter, the other rather less, composed of soft caseous substance gritty around the margins.

Right Prescapular Gland.—The right prescapular gland measured 4·3 by 2·5 by 1·3 cm.; on section it showed a softened caseous nodule 1 cm. in diameter and about half-a-dozen miliary caseous tubercles.

Lungs.—The lungs were pink and crepitant and collapsed normally; they showed under the pleura as well as in the depth fairly numerous evenly distributed grey fibrous tubercles, the largest 1 mm. in diameter; some were slightly opaque in the centre. In the caudal lobes near the surface were many firm slightly raised patches, not so pink as the surrounding lung and composed apparently of aggregations of grey foci (pieces floated in water). They were caused by filariæ, the embryos of which could be demonstrated in large numbers in a smear preparation.

Liver.—A few yellow and greenish-yellow foci of a doubtful nature were seen in the substance.

Kidneys.—In the cortex of one there was a pale grey streak; in that of the other just under the capsule there was a grey nodule (2 mm. in diameter). This on section penetrated the whole thickness of the cortex and had a yellow caseous centre and grey margins.

Mammary Gland.—The quarters were cut up into thin longitudinal strips. On passing those of the left between the finger and thumb, a number of hard bodies were felt; these on section were tubercles about the size of a millet seeds with fibrous margins and yellow caseous gritty centres which were readily shelled out; one of the tubercles projected into one of the ducts; besides these tubercles there were two hard nodules, the largest 1 cm. in diameter, which was composed of denser tissue than the surrounding gland tissue and contained yellow caseous foci; no tubercles were seen in the right gland, but there was a small firm patch beset with caseous points. The milk sinuses and ducts did not contain any milk and the mucous membrane was normal.

Mesenteric Glands.—Most of the mesenteric glands contained a number of soft yellow gritty tubercles arranged around the cortex, and in places aggregated together to form irregular caseo-calcareous patches.

All the other organs and glands were examined and found to be normal.

Microscopical Examination.

Tubercle from Kidney.—One tubercle bacillus seen.

Focus from Liver.—No tubercle bacilli.

Firm Patch from Lung.—No tubercle bacilli. Numerous embryos.

Tubercle from Lung.—No tubercle bacilli seen.

Emulsion of Prescapular Gland.—Tubercle bacilli in moderate numbers.

Tubercle from Mesenteric Gland.—One tubercle bacillus seen after prolonged search.

Mammary Gland	*The yellow centre of a tubercle.*—No tubercle bacilli seen. *Three foci from one of the nodules.* — One tubercle bacillus seen.

Animals Inoculated.

Rabbits 1741 and 1742 were inoculated subcutaneously with an emulsion made from the left prescapular gland. Both died of general tuberculosis the former in 145, the latter in 157 days.

Guinea-pig 2980 was inoculated intraperitoneally with an emulsion made from the spleen. It was healthy when killed after 94 days.

For tables of guinea-pigs inoculated with the milk and faeces of Goat 55, see the "Report on the Excretion of Tubercle Bacilli in milk."

VIRUS H. 93. "C.D."

GENERAL MILIARY TUBERCULOSIS.

AND

VIRUS H. 98. "B.R."

TUBERCULOUS MENINGITIS.

VIRUS H. 93. "C.D."

(September 25, 1907.)

CULTURE INOCULATIONS.

LUNG.

I.—JANUARY 2, 1908.

The strain was derived from the human lung through Guinea-pig 2610 and had been in artificial cultivation a total period of 78 days.
The culture used was the 6th generation, 22 days old.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1637	Intrav.	1·0 mg.	D. 85 days	T. of lungs (severe), bronchial glands, and kidneys.
1635	Intrav.	Less than 1·0 mg.	D. 18 "	G. T.
1636	Intrav.	Less than 0·1 mg.	K. 232 "	Chronic G. T.
1640	Subcut.	100·0 mg.	D. 55 "	Local T. Early T. of lungs and one kidney. ? Cause of death.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
2862	Intrap.	1·0 mg.	D. 18 days	G. T.
2863	Subcut.	1·0 mg.	D. 39 "	G. T.

PIG 111.

Subcutaneous.
Dose : 50·0 mg.
Killed : September 10, 1908.
252 days.

P.M.—There were small scattered caseous nodules around the site of inoculation; the right inguinal and ventral mediastinal glands were wholly or partly caseous. The lungs contained sparsely scattered small calcified tubercles.

PIG 113.

Subcutaneous.
Dose : 100·0 mg.
Killed : September 11, 1908.
253 days.

P.M. — There was a small fibro - calcareo - caseous local lesion. One inguinal gland contained a large caseo-calcareous mass; a ventral mediastinal gland was caseo-calcareous throughout. The lungs contained sparsely scattered calcareous tubercles; in one bronchial gland there was a minute focus.

GUINEA-PIG 3267.
Intraperitoneal.
Emulsion of lung.
Killed after 78 days.
Slight G.T.

LUNG.

II.—JANUARY 2, 1908.

The strain was derived from the human lung through Guinea-pig 2609 and had been in artificial cultivation a total period of 78 days.
The culture used was the 4th generation, 22 days old.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1638	Subcut.	50·0 mg.	K. 232 days	No local lesion ; one nodule in lung.
1639	Subcut.	50·0 mg.	K. 232 "	Local lesion ; one tubercle in lung.

ACNE.

FEBRUARY 11, 1908.

The strain was derived from the human acne spots through Guinea-pig 2611 and had been in artificial cultivation a total period of 89 days.
The culture used was the 6th generation, 25 days old.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1720	Intrav.	1·0 mg.	K. 192 days	Slight T. of lungs only.
1721	Subcut.	50·0 mg.	K. 60 "	Local lesion and slight T. of lungs.
1722	Subcut.	50·0 mg.	K. 192 "	Local lesion and slight T. of lungs.
1723	Subcut.	50·0 mg.	D. 38 "	Local lesion and one tubercle in the lung. ? Cause of death.

PIG 111. Virus H. 93. "C.D."

Subcutaneous inoculation of culture derived from the lung through Guinea-pig 2610.

Dose—50·0 milligrammes.

Date of Inoculation—January 2, 1908. [Age 7½ weeks.]

Killed when in good health—September 10, 1908. [252 days after inoculation.]

Clinical Notes.

The pig remained well during the experiment and grew normally.

Weights.

	cwt.	qrs.	lbs.
January 2, 1908	0	1	7
September 10, 1908	1	2	3

Total gain of weight.—1 cwt. 24 lbs.

Average rate of gain per week.—3·8 lbs.

POST-MORTEM EXAMINATION.

The carcass was fat.

Local Lesion.—At the seat of inoculation on the right side of the abdomen there was a slightly raised ridge of skin about 5 cm. in length which was a little whiter and smoother than normal; in the subcutaneous tissues beneath there was a patch of scar tissue; in this as well as in the surrounding fat and muscles there were scattered discrete caseous nodules varying in size from a millet to a hemp seed.

Inguinal Glands.—On the right side there was one enlarged gland measuring 3 by 2·5 by 1·5 cm. which on section was composed throughout of pinkish-yellow cheesy caseous substance.

The glands on the left side were normal.

Ventral Mediastinal Glands.—The one on the right side contained a cheesy caseous mass 1 cm. in diameter.

The one on the left side was normal.

Thorax.

Lungs.—The lungs showed under the pleura sparsely scattered hard tubercles, the largest the size of a millet seed; they were completely calcified the calcareous substance being stony hard and enclosed in a thin fibrous capsule. One or two similar tubercles were seen on section.

Bronchial Glands, Heart, and Pleura.—Normal.

Abdomen.

Omentum and Peritoneum.—Normal.

Liver.—In the substance at one margin there was a dry cheesy pea-sized nodule (probably parasitic); otherwise the liver was normal.

All other organs and glands were examined and found normal.

Microscopical Examination.

Crushed Tubercle from Lung.—A few tubercle bacilli.

Nodule from Liver.—No tubercle bacilli.

PIG 113. Virus H. 93. "C.D."

Subcutaneous inoculation of culture derived from the lung through Guinea-pig 2610.

Dose—100·0 milligrammes.

Date of Inoculation—January 2, 1908. [Age 7½ weeks.]

Killed when in good health—September 11, 1908. [253 days after inoculation.]

Clinical Notes.

The pig remained well during the experiment, and grew normally.

Weights.

	cwt.	qrs.	lbs.
January 2, 1908	0	1	7
September 11, 1908	1	1	4

Total gain of weight.—3 qrs. 25 lbs.

Average rate of gain per week.—3 lbs.

POST-MORTEM EXAMINATION.

The carcass was fat.

Local Lesion.—The skin of the abdomen on the right side showed a linear puckered scar in which there were a few pinhead-sized caseous tubercles. Beneath the scar in the subcutaneous fatty tissues there was a small patch of fibrous tissue with puckered margins which contained scattered calcareo-caseous tubercles.

Inguinal Glands.—In one of the glands on the right side there was a caseo-calcareous mass measuring 3 by 2·5 by 1·3 cm., which readily shelled out from a thin fibrous capsule. The glands on the left side were normal.

Ventral Mediastinal Glands.—On the right side there was a gland the size of a filbert, which was caseo-calcareous throughout.

Thorax.

Pleura.—Normal.

Lungs.—The lungs were normal in general appearance; they showed throughout the parenchyma scattered calcareous tubercles with grey margins, the largest about 1 mm. in diameter; twenty-five were counted on the dorsal surface of the right caudal lobe.

Bronchial Glands.—The bronchial glands were normal in size. In the left bronchial there was one minute calcareous focus. The others were normal.

Heart.—Normal.

All other organs and glands were examined and found normal.

Animal Inoculated.—Guinea-pig 3267 was inoculated intraperitoneally with an emulsion made from the lung. It was killed after 78 days, and showed slight general tuberculosis.

VIRUS H. 98. "B.R."

(January 9, 1908.)

CEREBRO-SPINAL FLUID.

CULTURE INOCULATIONS.

I.—March 13, 1908.

The strain was derived from the fluid through Guinea-pig 2878 and had been in artificial cultivation a total period of 49 days.

The culture used was the 4th generation, 13 days old.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
2998	Intrap.	1·0 mg.	D. 18 days	G. T.
2999	Subcut.	1·0 mg.	D. 51 "	G. T.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1768	Intrav.	1·0 mg.	D. 68 days	Slight T. of lungs and kidneys.
1765	Intrav.	0·1 mg.	D. 59 "	Slight T. of lungs and kidneys. Death from psorospermosis.
1764	Intrav.	0·01 mg.	K. 162 "	One tubercle in lung only.
1766	Subcut.	50·0 mg.	K. 162 "	Local lesion only.
1767	Subcut.	50·0 mg.	K. 162 "	Local lesion and slight T. of lungs and of one kidney; not apparently progressive.

II.—June 3, 1908.

The same strain of culture was used after 131 days artificial cultivation.

The culture used was the 10th generation, 17 days old.

KITTENS.

Number.	Method.	Dose.	Duration of Life.	Result.
55	Intra-muscular	1·0 mg.	K. 88 days	Local lesion only.
59	Intrap.	Rather less than 1·0 mg.	D. 23 "	No visible lesions; few T. B. in organs; no apparent cause for death.
53	Subcut.	1·0 mg.	D. 8 "	No apparent cause for death.
57	Subcut.	1·0 mg.	D. 12 "	Local lesion. Death from pneumonia.

GOAT 69.

Subcutaneous.

Dose: 10·0 mg.

Killed: September 25, 1908.

114 days.

P.M.—There was a small softened caseous encapsuled mass at the seat of inoculation. The mamma was tuberculous, the tissue of the right half was tough and beset with shotty tubercles with caseous or calcareous centres; the left half was similar but the tubercles were not so numerous. There was no sign of tuberculosis elsewhere but an emulsion of the enlarged right supramamary gland produced tuberculosis in a guinea-pig.

GOAT 69. [Adult Female.] Virus H. 98. "B.R."

Subcutaneous inoculation of culture derived from the human cerebro-spinal fluid through Guinea-pig 2878.

Dose—10·0 milligrammes.

Date of Inoculation—June 3, 1908.

Killed when in good health—September 25, 1908. [114 days after inoculation.]

ABSTRACT OF POST-MORTEM NOTES.

(For details *see* the "Report on the Excretion of Tubercle Bacilli in Milk.")

There was a small softened caseous encapsuled mass in the subcutaneous tissues at the seat of inoculation; the adjacent prescapular gland was normal in size and on section.

The right half of the mammary gland was larger than the left; on section the tissue of the right half was very tough and fibrous and beset with shotty miliary tubercles with fibrous margins and calcareous or caseo-calcareous (in a few cases caseous and softened) centres; there was also a caseo-calcareous nodule the size of a wheat grain. The left half of the mamma was similar to the right but the tubercles were not so numerous The supramammary glands were enlarged and oedematous; a guinea-pig inoculated with an emulsion made from the right gland became tuberculous.

KITTENS 53, 57, 55 and 59. Virus H. 98. 'B.R."

Inoculated with culture derived from the human cerebro-spinal fluid through Guinea-pig 2878.

Date of Inoculations—June 3, 1908.

Kitten 53. *Subcutaneous.*

Dose—1·0 milligramme.

Died—June 11, 1908. [8 days after inoculation.]

Weights—June 3, 1908. 850 grammes.
June 11, 1908. 650 grammes.

POST-MORTEM EXAMINATION.

The body was emaciated. There was no tuberculosis and no apparent cause for death.

Kitten 57. *Subcutaneous.*

Dose—1·0 milligramme.

Died—June 15, 1908. [12 days after inoculation.]

Weights—June 3, 1908. 800 grammes.
June 15, 1908. 620 grammes.

POST-MORTEM EXAMINATION.

There was a small caseous abscess at the seat of inoculation. There was pneumonia of the right lung, both lobes.

All the other organs and the glands appeared normal.

Microscopical Examinations.

Smear from Pneumonic Lung Tissue.—Numerous diplo-cocci and diplo-bacilli. No tubercle bacilli.

Smear from Liver Substance.—No tubercle bacilli.

Kitten 55. *Intramuscular.*

Dose—1·0 milligramme.

Killed—August 30, 1908. [88 days after inoculation.]

Weights—June 3, 1908. 1,000 grammes.
August 30, 1908. 1,200 grammes.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—In the muscle wall of the abdomen a little to the left of the umbilicus there was an irregular mass of yellow caseous substance 4 cm. in length, 1·5 cm. in breadth, and 0·7 cm. in greatest thickness.

There was no sign of tuberculosis elsewhere.

Microscopical Examinations.

Smear from the Local Lesion.—Tubercle bacilli numerous.

Smear from the Spleen.—No tubercle bacilli.

Kitten 59. *Intraperitoneal.*

Dose—Rather less than 1·0 mg.

Died—June 26, 1908. [23 days after inoculation.]

Weights—June 3, 1908. 870 grammes.
June 26, 1908. 610 grammes.

POST-MORTEM EXAMINATION.

There were no macroscopic tuberculous lesions, and there was no apparent cause for death.

Microscopical Examination.

Smears from the *lung*, *liver*, and *spleen* showed each a few tubercle bacilli. A smear from a *kidney* showed no tubercle bacilli.

VIRUS H. 104. "E.R."

TUBERCULOSIS OF THE LUNGS WITH CALCAREOUS MESENTERIC GLANDS.

VIRUS H. 104. "E.R."

(February 11, 1908.)

CULTURE INOCULATIONS.

LUNG.

I.—April 2, 1908.

The strain was derived from the human lung direct, and had been in artificial cultivation a total period of 51 days.

The culture used was the 5th generation, 7 days old.

CALF 1385.

Intravenous.
Dose : 5·0 mg.
Died : May 1, 1908.
29 days.
P.M.—Acute tuberculosis.

CALF 1393.

Subcutaneous.
Dose : 50·0 mg.
Killed : July 28, 1908.
117 days.

P.M.—Large local cyst filled with caseo-pus and firm caseous masses. The left prescapular gland was three-quarters caseous and calcareous ; one prepectoral gland was caseous throughout. In the lungs were seen a few small grey tubercles. Most of the peripheral glands contained scattered caseous gritty tubercles ; there were scattered calcareous foci in the mesenteric glands.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1807	Intrav.	1·0 mg.	D. 18 days	Early G. T. Severe pseudo-T. of spleen.
1808	Intrav.	0·1 mg.	D. 33 ,,	Miliary T. of lungs and kidneys. Death from cellulitis.
1809	Intrav.	0·01 mg.	D. 16 ,,	Early T. of lungs ; severe psorospermosis of liver.
1810	Subcut.	27·0 mg.	K. 168 ,,	Local lesion ; slight T. of lungs and kidneys, and T. of two mammary glands.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
3018	Subcut.	1·0 mg.	D. 7 days	Local T. only.
3017	Subcut.	0·1 mg.	D. 28 ,,	Early G. T. insufficient to account for death.

VIRUS H. 104. "E.R."—*continued.*

CULTURE INOCULATIONS—*continued.*

LUNG.

II.—May 1, 1908.

The strain was derived from the human lung, and had been in cultivation a total period of 80 days.

The culture used was the 8th generation, 10 days old.

MONKEY 159.
Subcutaneous.
Dose: 1·0 mg.
Died: May 13, 1908.
12 days.

P.M.—Soft caseous local lesion and no tuberculosis elsewhere.

MONKEY 161.
Subcutaneous.
Dose: 0·01 mg.
Died: June 2, 1908.
32 days.

P.M.—General tuberculosis.

RABBIT 1844.
Intravenous.
Dose: 0·01 mg.
Killed after 152 days.

P.M.—Slight tuberculosis of lungs and kidneys.

LUNG.

III.—February 18, 1909.

The strain was derived from the human lung direct, and had been 373 days in artificial cultivation.

The culture used was the 19th generation, 13 days old.

COW 565.
Intravenous.
Dose: 10·0 mg.
Killed: Aug. 19, 1909.
182 days.

P.M.—No sign of tuberculosis. One or two T.B. were seen in smear preparations made from scrapings from the mucous membrane of the uterus (the cow had given birth to a dead foetus a month previously).

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
3514	Intrap.	0·01 mg.	D. 43 days	G. T.
3515	Intrap.	0·01 mg.	D. 20 „	Early slight G. T.

MESENTERIC GLAND.

May 8, 1908.

The strain was derived from the human mesenteric gland, and had been in cultivation a total period of 87 days.

The culture used was the 4th generation, 17 days old.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1845	Intrav.	1·0 mg.	D. 24 days	G. T.
1846	Intrav.	0·1 mg.	D. 131 „	Slight T. of lungs and kidneys. Death from cellulitis of back.
1847	Intrav.	0·01 mg.	K. 143 „	Slight T. of lungs and kidneys.
1848	Subcut.	50 0 mg.	K. 143 „	Local lesion and slight T. of lungs.

CALF 1385. Virus H. 104. "E.R."

Intravenous inoculation of culture derived from the human lung, direct.

Dose—5·0 milligrammes.

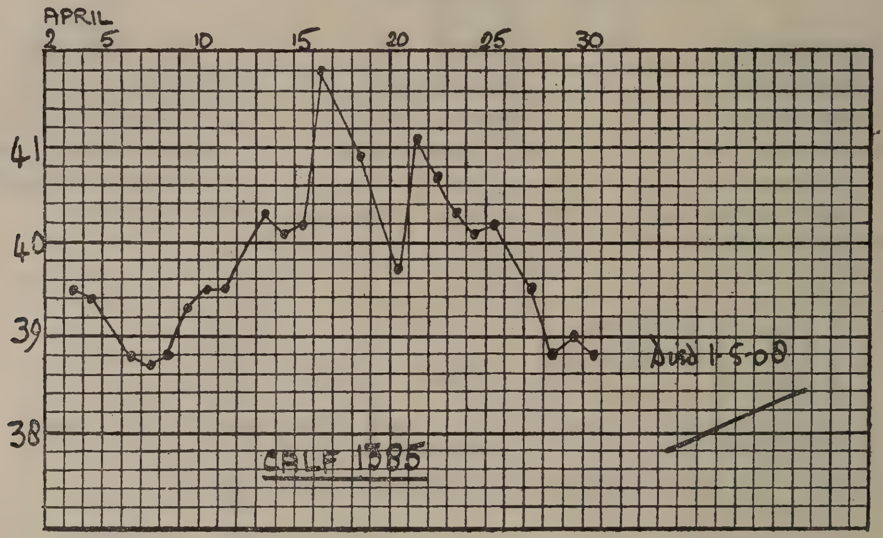
Date of Inoculation—April 2, 1908. [Age about 9 weeks.]

Died—May 1, 1908. [29 days after inoculation.]

Clinical Notes.

The calf gradually became thin, weak, and ill-looking; the respiration did not become increased in frequency to any noticeable extent. The calf grew weaker and more emaciated, and died on the 29th day after inoculation.

Temperature.



Tuberculin Test.

The calf was not tested subsequent to inoculation.

Weights.

	qrs.	lbs.
April 2, 1908	3	26
May 1, 1908	3	6

Total loss of weight.—20 lbs.

Average rate of loss per week.—5 lbs.

POST-MORTEM EXAMINATION.

The carcass was thin.

Local Lesion.—Lying along the left jugular vein at the site of inoculation there was an elongated swelling measuring 6·3 by 2 cm. On section it was composed of dense yellow caseous substance set in congested fibroid tissue; projecting from the intima of the vein opposite the centre of the caseous mass there was a small irregular firm body about the size of a hemp seed which was apparently an organising blood-clot.

Left Prepectoral Gland.—One left prepectoral gland was packed with confluent yellowish foci set in congested gland tissue.

Left Cervical Gland.—A mid cervical gland on the left side was similar.

Thorax.

Lungs.—The lungs were heavy weighing 5 lbs. 2 ozs. The greater portion of the anterior lobes was dark red in colour and airless; a fringe of air-containing tissue remained in places around the margins of the lobes which merged into solid dark red tissue as the thicker parts of the lobes were reached. Nearly the whole of the left posterior lobe was dark red and airless; air-containing tissue in which patches of congested tissue were seen remained along the dorsal surface and towards the caudal tip. In the right posterior lobe the dark red areas were less extensive.

Exceedingly numerous very minute greyish white tubercles were visible in the dark red portions of the lung; they were only slightly less numerous in the air-containing portions.

On section the lungs were seen to be almost entirely consolidated and dark red, and some portions which were still air-containing and pinkish in colour only just floated in water. The whole lung was closely packed with minute tubercles similar to those on the surface, giving the cut surface a granular appearance.

The right middle lobe was firmer than the solid parts of the left lobe and on section was mottled with yellow and red areas, the yellow preponderating; many of the lobules were yellow and necrotic around the margins and had a red patch in the centre; others were necrotic almost throughout. Several lobules in the midst of the left caudal lobe were firm and yellow and necrotic almost throughout; they closely resembled tuberculous lobules in a state of early caseation with the exception that the necrosis was more homogeneous.

The pulmonary artery running through the right caudal lobe was filled with a firm yellow thrombus which was readily removed.

Thoracic Glands.—The bronchial and mediastinal glands were moderately large; the bronchial and interbronchial glands showed their cortices composed of rather soft greyish tissue containing irregular yellow foci in places forming a network; the dorsal mediastinal glands were deeply congested and showed the cortices beset, some more closely than others, with grey tubercles, many with irregular yellowish central foci.

Heart.—All the cavities were filled with dark red blood-clot. The endocardium of the right auricle and ventricle showed fairly numerous minute pearly grey tubercles; the left side of the heart was normal. The heart muscle was normal.

Pleura.—The fringes along the borders of the ribs were congested.

Abdomen.

Omentum and Peritoneum.—Normal.

Spleen.—The spleen was flabby and atrophied.

Liver.—A moderate number of very minute whitish foci was just visible on the surface of the liver; on section similar foci were seen, and appeared in places to be very numerous.

Portal Glands.—The portal glands were slightly enlarged and oedematous; no tubercles were seen in them.

Coeliac Glands.—Normal.

Kidneys.—A moderate number of minute whitish foci were faintly visible on the surface of the right kidney, and there were a few larger and more definite tubercles; three were seen on section in the cortex.

The left kidney was smaller than the right; many of the lobules were yellowish in colour and on section the cortex and medulla were found to be homogeneous canary yellow in colour and friable; the cortices of some of the other lobules were paler than normal, the rest had a normal colour; the pyramids of all the latter lobules had however a canary yellow colour and resembled the completely necrosed lobules; the kidney had a somewhat foetid odour; the renal artery was filled with a yellow firm thrombus.

In the pale lobules minute grey points were seen, but could not be detected elsewhere.

All the remaining organs and glands were examined and found normal.

Microscopical Examination.

(Smears from):—

Necrotic Lung. — Tubercle bacilli in moderate numbers.

Dark red consolidated Lung.—Tubercle bacilli in moderate numbers.

Yellow Thrombus in Pulmonary Artery. — No tubercle bacilli seen.

Liver.—A moderate number of tubercle bacilli.

Spleen.—A few tubercle bacilli.

Suprarenal Body.—A few tubercle bacilli.

Gluteal Gland.—No tubercle bacilli seen.

CALF 1393. Virus H. 104. "E.R."

Subcutaneous inoculation of culture derived from the human lung, direct.

Date of Inoculation—April 2, 1908. [Age about 15 weeks.]

Dose—50·0 milligrammes.

Killed when in good health—July 28, 1908. [117 days after inoculation.]

Clinical Notes.

The calf remained well during the experiment.

Temperature.

On the 7th day after inoculation the temperature rose to 40·3° C. and reached a maximum of 41·0° C. on the 15th day; the temperature was raised for a period of twenty-three days in all. Subsequently it remained normal.

Weights.

	cwt.	qr.	lbs.
April 2, 1908	1	1	8
July 28, 1908	2	0	0

Total gain of weight.—2 qrs. 20 lbs.

Average rate of gain per week.—4·4 lbs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—At the seat of inoculation there was a prominent elongated fluctuating tumour measuring 18 by 7·5 by 5·5 cm. On section it was a cyst filled with thick caseo-pus and firm caseous masses.

Left Prescapular Gland.—The left prescapular gland measured 7·8 by 4 by 3 cm. and showed about three-quarters of the gland substance caseous and calcareous; the caseous substance was beginning to break down in the central and marginal parts.

Right Prescapular Gland.—The right prescapular gland measured 5 by 2 by 1 cm. and showed in the cortex four yellow caseous gritty tubercles, the largest the size of a millet seed.

Prepectoral Glands.—On the left side one gland was nearly 2 cm. in diameter; on section it was caseous throughout and slightly gritty; the capsule was greatly thickened. The rest were normal.

Cervical and Axillary Glands.—Normal.

Lungs.—The lungs were perfectly normal in general appearance; they showed under the pleura very sparsely scattered small grey tubercles, one of which had a calcareous centre.

Submaxillary and Parotideal Glands. — These glands showed in their cortices sparsely scattered caseous gritty tubercles ranging in size up to a millet seed.

Mesenteric Glands.—The mesenteric glands contained sparsely scattered calcareous foci.

Various Lymphatic Glands.

Precrural.—The right precrural gland contained half-a-dozen yellow caseous slightly gritty tubercles, the largest the size of a pin's head; the left precrural contained one minute yellow focus.

Popliteal.—The popliteal glands showed in their cortices sparsely scattered caseous gritty tubercles ranging in size up to a millet seed.

Ischiatic.—Each ischiatic gland contained several caseous and softened gritty tubercles up to 2 mm. in diameter.

Gluteal.—One gluteal gland contained a few caseous tubercles, the other was normal.

Pudic.—Normal.

The remaining organs and glands were examined and found normal.

RHESUS MONKEY 159. Virus H. 104. "E.R."

(A young animal.)

Subcutaneous inoculation of culture derived from the human lung, direct.

Dose—1·0 milligramme.

Date of Inoculation—May 1, 1908.

Died—May 13, 1908. [12 days after inoculation.]

Clinical Notes.

Soon after inoculation the monkey appeared unwell; it grew weaker, lost appetite, and became thin, and was found dead on the 13th day after inoculation.

POST-MORTEM EXAMINATION.

The carcass was thin. Its weight was 1200 grammes.

Local Lesion.—At the seat of inoculation between the shoulders there was a soft caseous lesion.

The adjacent axillary and cervical glands were normal, and there was no sign of disease elsewhere.

RHESUS MONKEY 161. Virus H. 104. "E.R."

(A young animal.)

Subcutaneous inoculation of culture derived from the human lung, direct.

Dose—0·01 milligramme.

Date of Inoculation—May 1, 1908.

Died—June 2, 1908. [32 days after inoculation.]

POST-MORTEM EXAMINATION.

The carcass was emaciated.

Local Lesion.—Over the lower angle of the left scapula there was a flat space 2 cm. in greatest diameter containing a small quantity of ill-formed pus and showing in the muscles around small caseous nodules. The skin over it was thin and showed two irregular openings covered with a dry scab.

Axillary Glands.—On the right side one contained a softened caseous nodule 2 mm. in diameter, another an early caseous focus.

On the left side one enlarged gland contained a softened caseous patch 5 mm. in diameter and several smaller ones.

Another the size of a broad bean was caseous and softened throughout.

Cervical Glands.—One on the right side behind the clavicle contained a softened caseous nodule 2 mm. in diameter. One on the left side in the lower part of the neck showed a small caseous tubercle.

Inguinal and Lumbar Glands.—The left inguinal glands were enlarged and contained several softened caseous nodules.

In the right inguinal glands there were two caseous tubercles, and several lumbar glands, slightly enlarged, contained one or two caseous nodules up to 2 mm. in diameter.

Vertebral Glands.—On the left side in the 9th and 10th interspaces there were three caseous and softened glands, the largest the size of a pea.

On the right side in the 9th interspace one contained a caseous tubercle.

A gland behind the manubrium sterni on the left side was a centimetre in diameter and caseous and softened throughout.

Thorax.

Lungs.—The lungs collapsed normally, the left caudal lobe adhering to the enlarged vertebral glands. They were crepitant and contained sparsely scattered shotty tubercles with caseous centres and grey margins.

Bronchial Glands.—The bronchial glands were slightly enlarged and each contained two or three caseous tubercles, the largest 2 mm. in diameter.

Heart and Pericardium.—The pericardial sac was filled with blood-stained serous fluid.

In the muscle of the left ventricle under the pericardium there was a pinhead-sized caseous tubercle.

The valves were normal.

Abdomen.

The peritoneal cavity contained a quantity of blood-stained serous fluid.

Omentum.—In the omentum there was one pinhead-sized caseous tubercle.

Peritoneum.—Normal.

Spleen.—The spleen was perhaps slightly enlarged —it measured 5 by 2·5 by 1·4 cm.—and contained moderately numerous firm yellowish caseous tubercles varying in size from rather less than 0·5 mm. up to 2 mm. in diameter.

Splenic Lymphatic Glands.—One contained a small caseous tubercle.

Liver.—The liver was pale and moderately closely beset with yellow caseous tubercles varying in size from about 0·5 up to 1·5 mm. in diameter.

Pancreatic Gland.—A gland on the head of the pancreas was enlarged and its substance extensively replaced by small caseous areas.

Kidneys.—The kidneys were normal in colour; the right showed on the surface two caseous tubercles the largest a millimetre in diameter. None were seen on section. There was one miliary tubercle in the cortex of the left.

Alimentary Tract.

Submaxillary and Pharyngeal Glands.—Each submaxillary and each pharyngeal gland contained a breaking-down caseous tubercle.

Intestines.—The intestines were distended, but otherwise normal.

Mesenteric Glands.—There were two small softened caseous nodules in the mesenteric glands.

The ileo-colic and colic glands were normal.

Other organs and glands were examined and found normal.

Microscopical Examination.

Tubercle from Heart.—Extremely numerous tubercle bacilli (resembling a pure culture).

COW 565. Virus H. 104. "E.R."

Intravenous inoculation of culture derived from the human lung direct.

Dose—10·0 milligrammes.

Date of Inoculation—February 18, 1909.

Killed when in good health—August 19, 1909. [182 days after inoculation.]

At the post-mortem examination no sign of tuberculosis was seen in any of the organs or glands.

One or two tubercle bacilli were seen in smear preparations made from scrapings from the mucous membrane of the uterus (the cow had given birth to a dead foetus a month previously), and very numerous tubercle bacilli were seen in the discharge from the vagina.

For full Clinical and Post-mortem notes on the Cow *see* the Report on the Excretion of Tubercle Bacilli in Milk.

VIRUS H. 115. "N.G."

TUBERCULOUS MENINGITIS.

VIRUS H. 115. "N.G."

(May 28, 1908.)

CEREBRO-SPINAL FLUID.

CULTURE INOCULATIONS.

I.—September 3, 1908.

The strain was derived from the human cerebro-spinal fluid through Guinea-pig 3087 (pyloric gland), and had been 58 days in artificial cultivation.

The culture used was the 4th generation, 22 days old.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
1984	Intrav.	0·1 mg.	K. 145 days	T. of lungs (severe), kidneys, and mamma.
1985	Intrav.	0·1 mg.	D. 23 „	Early T. Death from injuries.
1987	Subcut.	32·0 mg.	K. 145 „	Local lesion and slight T. of lungs.
1986	Subcut.	10·0 mg.	K. 145 „	

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
3266	Intrap.	1·0 mg.	D. 33 days	G. T.
3264	Intrap.	0·1 mg.	D. 27 „	G. T.
3265	Subcut.	0·1 mg.	D. 94 „	G. T.

II.—December 18, 1908.

The strain was derived from the cerebro-spinal fluid through Guinea-pig 3087, and had been 164 days in artificial cultivation.

The culture used was the 11th generation, 8 days old.

GOAT 81.

Intravenous.

Dose : 2·0 mg.

Died : January 28, 1909.

41 days.

P.M. — Tuberculosis of lungs and thoracic glands.

GOAT 81. [Adult Female.] Virus H. 115. "N.G."

Intravenous inoculation of culture derived from the original material through Guinea-pig 3087.

Dose—2·0 milligrammes.

Date of Inoculation—December 18, 1908.

Died—January 28, 1909. [41 days after inoculation.]

ABSTRACT OF POST-MORTEM NOTES.

(For details *see* the "Report on the Excretion of Tubercle Bacilli in Milk.")

There was a small collection of caseo-pus in the muscles near the jugular vein at the seat of inoculation. The greater part of the lungs was firm and airless showing greyish areas surrounded by reddish tissue, many of the grey areas having ill-defined yellowish centres. The rest of the lungs was congested and firmer than normal but was air containing; it was closely beset with almost transparent miliary tubercles.

The thoracic glands were much enlarged and composed of reddish tissue mottled with small translucent grey areas.

There were no tuberculous lesions elsewhere in the body.

TWO CATS INOCULATED WITH A CULTURE FROM VIRUS H. 13. "A.D."

(*See* "Appendix to the Second Interim Report." Vol. II., page 279, *et sequitur* for other experiments with this Virus.)

CAT 15. Virus H. 13. "A.D."

Intraperitoneal inoculation of culture derived from Calf 301. (1st passage.)

Dose—20·0 milligrammes.

Date of Inoculation—February 4, 1907.

Died—February 19, 1907. [15 days after inoculation.]

Weights.

	grammes
February 4, 1907	3,270
February 19, 1907	2,310

Total loss.—960 grammes.

POST-MORTEM EXAMINATION.

Local Lesion.—There was a small collection of ill-formed brownish pus in the subcutaneous tissues and a small yellow caseous nodule in the muscle wall of the abdomen.

Abdomen.

Omentum and Peritoneum.—In the middle of the omentum there was a patch measuring 4 by 4 by 0·6 cm. of greenish-yellow friable necrotic substance; elsewhere the omentum was congested and showed one or two small yellow necrotic patches. There were no tubercles on the peritoneum or mesentery.

Spleen.—The spleen was (?) slightly enlarged; the Malpighian bodies were conspicuous, but in none of them was there any sign of caseation or necrosis.

Liver.—The liver was normal in colour; it contained very numerous small grey or greyish-white tubercles.

Kidneys.—The kidneys were pale and fatty-looking; no tubercles were seen.

Suprarenal Bodies.—Normal.

The Portal, Coeliac, and other abdominal lymphatic glands were enlarged and congested.

Mesenteric Glands.—One mesenteric gland contained a yellow focus.

Thorax.

On opening the thorax the lungs were found to be collapsed and of a dark red colour, the various lobes on each side being glued together; the parietal and visceral pleura were congested and covered with greenish-yellow fibrino-purulent lymph, most abundant along the ventral mediastinum and in the anterior part of the thorax, *i.e.*, in the neighbourhood of the ventral mediastinal gland from which infection had apparently spread. In the pleural cavities there was also a small quantity of clear yellow serous fluid.

Ventral Mediastinal Glands.—The ventral mediastinal glands were enlarged, yellow and caseo-necrotic throughout, and the tissues around them were infiltrated and necrotic. Between the muscles and the sternum, extending from the xiphisternum to the ventral mediastinal glands, was a layer of yellow caseo-pus.

Lungs.—No tubercles were seen in the lungs.

Bronchial Glands.—The bronchial glands were enlarged and haemorrhagic.

Heart and Pericardium.—Normal.

Microscopical Examination.

Fibrino-purulent Lymph from Pleura.—Tubercle bacilli extremely numerous.

Smear from the Liver.—Tubercle bacilli fairly numerous.

Smear from the Spleen.—No tubercle bacilli seen.

CAT 17. Virus H. 13. "A.D."

Intraperitoneal inoculation of culture derived from Calf 301. (1st passage.)

Dose—20·0 milligrammes.

Date of Inoculation—February 4, 1907.

Killed when dying—February 16, 1907. [12 days after inoculation.]

Weights.

	grammes
February 4, 1907	1150
February 16, 1907	900

Loss of weight.—250 grammes.

POST-MORTEM EXAMINATION.

Local Lesion.—There was a small collection of soft yellow necrotic substance in the subcutaneous tissues of the abdominal wall.

Abdomen.

The peritoneal cavity was partly filled with pale serous fluid containing a few small flakes of fibrin.

Omentum and Peritoneum. — The omentum was moderately thickened, and composed of yellow necrotic substance surrounding small islands of grey translucent tissue.

The peritoneum had a thin complete covering of fibrinous lymph.

The mesentery was normal except for a few scattered grey foci.

Spleen. — The spleen was slightly enlarged and speckled with minute grey foci.

Liver.—The liver appeared normal.

Portal Gland.—The portal gland was enlarged and in a state of early caseation.

Kidneys and Suprarenal Bodies.—Normal.

Thorax.

Lungs.—The lungs were crepitant throughout; they were (?) slightly congested, otherwise perfectly normal.

Bronchial Glands, Heart, Pleura.—Normal.

Sternal Glands.—The sternal glands were much enlarged, and showed a coarse yellow caseo-necrotic network in a grey translucent matrix.

All other organs and glands were examined, and showed no naked-eye evidence of tuberculosis.

Microscopical Examination.

Smears from :—

Liver.—Tubercle bacilli numerous.

Spleen.—Tubercle bacilli numerous.

Marrow.—Tubercle bacilli numerous.

Sternal Gland. — Tubercle bacilli extremely numerous.

CHARTS OF THE INOCULATION EXPERIMENTS WITH THE TWENTY-NINE SPUTUM VIRUSES (H. 118 TO H. 145 INCLUSIVE, AND H. 147), AND FULL POST-MORTEM NOTES OF THE LARGER ANIMALS.

VIRUS H. 118. "F. C."

SPUTUM.

CULTURE INOCULATIONS.

I.—January 14, 1909.

The strain was derived from the original material through Guinea-pig 3343 and had been 55 days in artificial cultivation. The culture used was the 5th generation, 12 days old.

RHESUS MONKEY 263.

Subcutaneous.

Dose : 1·0 mg.

Died : February 19, 1909, 36 days.

P.M.—General tuberculosis.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2114	Intrav.	0·1 mg.	D. 126 days	Slight T. of lungs and kidneys.
2115	Intrav.	0·01 mg.	K. 152 „	Slight retrogressive T.
2116	Subcut.	10·0 mg.	D. 109 „	Local T. and slight T. of lungs; death from pseudo-tuberculosis.
2117	Subcut.	10·0 mg.	K. 152 „	Local T. and slight T. of lungs.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
3430	Intrap.	0·1 mg.	D. 14 days	G. T.
3431	Subcut.	0·1 mg.	D. 58 „	G. T.

FOWLS.

Number.	Method.	Dose.	Duration of Life.	Result.
153	Intrav.	50·0 mg.	D. 32 days	Acute T. (toxaemia).
151	Intrav.	10·0 mg.	D. 3 „	Death from injuries inflicted by companions.

II.—February 12, 1909.

The strain was derived from the original material through Guinea-pig 3343 and had been 84 days in artificial cultivation. The culture used was the 9th generation, 4 days old.

GOAT 77.

Subcutaneous.

Dose : 25·0 mg.

Killed : June 8, 1909. 116 days.

P.M.—Ulcerated fibro-caseous local tumour. Caseo-calcareous nodules in adjacent glands. Sparsely scattered caseous gritty tubercles in lungs.

GOAT 77. Virus H. 118. "F.C."

(Young adult female.)

Subcutaneous inoculation of culture derived from the original material through Guinea-pig 3343.

Dose—25·0 milligrammes.

Date of Inoculation—February 12, 1909.

Killed when in good health—June 8, 1909. [116 days after inoculation.]

ABSTRACT OF POST-MORTEM NOTES.

(For full details *see* Report on the Excretion of Tubercle Bacilli in Milk.)

There was a fibro-caseous ulcerated tumour at the seat of inoculation, and the adjacent (left) prescapular gland was enlarged and contained scattered caseo-calcareous nodules; several similar nodules were seen in loose connective tissue at one extremity of the gland. One left cervical gland contained a caseo-calcareous nodule and several small tubercles, and the right prescapular gland contained a small group of caseo-calcareous tubercles. In the lungs under the pleura sparsely scattered caseous gritty tubercles (up to 1 mm.) were seen, and also an occasional grey tubercle with a caseo-calcareous centre.

There was no sign of disease elsewhere.

RHESUS MONKEY 263. Virus H. 118. "F.C."

(A young animal.)

Subcutaneous inoculation of culture derived from the original material through Guinea-pig 3343.

Dose—1·0 milligramme.

Date of Inoculation—January 14, 1909.

Died—February 19, 1909. [36 days after inoculation.]

Clinical Notes.

The course of the disease was similar to that usually seen in monkeys suffering from acute tuberculosis. The weight at death was 1630 grammes.

POST-MORTEM EXAMINATION.

The carcass was emaciated.

Local Lesion.—Over the right scapula extending from the spines of the vertebrae to the posterior axillary line there was a large extensively ulcerated breaking-down caseous lesion measuring 6 by 3 by 1 cm.

Axillary Glands.—On the right side one the size of a broad bean was caseous and softened throughout; another contained two softened caseous nodules 3 mm. in diameter.

On the left side one a centimetre in diameter was caseous and softened throughout. The rest appeared normal.

Cervical Glands.—On the right side one the size of a large pea was caseous throughout. Three others were enlarged but not caseous.

There was a similar caseous gland on the left side and two other slightly enlarged ones showing early caseation in the cortex.

Vertebral Glands.—A gland in the 9th interspace on the right side hemispherical and 1 cm. in greatest diameter was caseous and softened throughout. One in the 10th interspace slightly enlarged was also caseous.

Thorax.

Lungs.—The lungs were crepitant throughout and contained five shotty tubercles caseating in the centre, the largest the size of a millet seed.

Bronchial Glands.—The bronchial glands were normal in size and slightly pigmented and contained two caseous tubercles.

Heart and Pleura.—Normal.

Abdomen.

The peritoneal cavity contained a slight excess of serous fluid.

Omentum.—There was one pearly grey submiliary tubercle on the omentum.

Peritoneum, Mesentery, and Meso-colon.—Normal.

Spleen.—The spleen was slightly enlarged, measuring 5 by 2·5 by 1·5 cm., and showed on section a moderate number of miliary tubercles, the majority greyish and opaque, a few yellow and caseous. There were besides three or four caseous nodules 2 mm. in diameter

Splenic Lymphatic Glands.—Slightly enlarged but showed no tubercles.

Liver.—The liver was closely beset with opaque whitish or creamy-white caseating tubercles ranging from a mere point up to rather more than a millimetre in diameter.

The glands on the pancreas contained each one or two caseous tubercles.

Kidneys.—The kidneys were pale, but no tubercles were visible.

Suprarenal Bodies.—Normal.

Alimentary Tract.

Tongue, Pharynx, Tonsils.—Normal.

Submaxillary and Pharyngeal Glands.—One submaxillary gland contained a caseous tubercle. The rest were normal.

Intestines and Mesenteric Glands.—Normal.

VIRUS H. 119. "E.S."

SPUTUM.

CULTURE INOCULATIONS.

March 12, 1909.

The strain was derived from human sputum through Guinea-pig 3439 (portal gland) and had been 19 days in artificial cultivation. The culture used was the 3rd generation, 4 days old.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2186	Intrav.	0·1 mg.	D. 65 days	T. of lungs and kidneys.
2187	Intrav.	0·01 mg.	K. 95 „	Slight generalised retrogressive T.
2188	Subcut.	23·0 mg.	K. 95 „	Slight generalised T.
2189	Subcut.	10·0 mg.	K. 95 „	Local lesion and slight retrogressive T. of lungs.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
3619	Intrap.	0·1 mg.	D. 11 days	Early G.T. insufficient to account for death.
3620	Subcut.	0·1 mg.	D. 55 „	G. T.

VIRUS H. 120. "B.W."

SPUTUM.

CULTURE INOCULATIONS.

March 16, 1909.

The strain was derived from the original material through Guinea-pig 3442 (manubrial gland) and had been 22 days in artificial cultivation. The culture used was the 3rd generation, 7 days old.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2191	Intrav.	0·1 mg.	D. 86 days	G.T. moderately severe in lungs.
2193	Intrav.	0·01 mg.	K. 98 „	Slight T. of lungs and kidneys.
2194	Subcut.	10·0 mg.	K. 98 „	Local T. and slight T. of lungs and a kidney.
2195	Subcut.	10·0 mg.	K. 98 „	Local T., T. of lungs and T. of one kidney (slight).

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
3621	Intrap.	0·1 mg.	D. 29 days	G. T.
3622	Subcut.	0·1 mg.	D. 77 „	G. T.

VIRUS H. 121. "E.A."

SPUTUM.

CULTURE INOCULATIONS.

March 22, 1909.

The strain was derived from the original material through Guinea-pig 3445 (manubrial gland) and had been 28 days in artificial cultivation. The culture used was the 3rd generation, 9 days old.

RABBITS.

Number	Method.	Dose.	Duration of Life.	Result.
2200	Intrav.	0·1 mg.	K. 94 days	Generalised T., moderately severe in lungs.
2201	Intrav.	0·01 mg.	K. 94 „	Slight T. of lungs, and ? of kidneys.
2202	Subcut.	26·0 mg.	K. 94 „	Local T. and slight T. of lungs.
2203	Subcut.	10·0 mg.	K. 94 „	

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
3631	Intrap.	0·1 mg.	D. 24 days	G. T.
3632	Subcut.	0·1 mg.	D. 57 „	G. T.

VIRUS H. 122. "F.P."

SPUTUM.

CULTURE INOCULATIONS.

I.—March 16, 1909.

The strain was derived from the original material through Guinea-pig 3446 (sternal and manubrial glands) and had been 22 days in artificial cultivation. The culture used was the 3rd generation, 7 days old.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2196	Intrav.	0·1 mg.	K. 99 days	Slight G. T.
2197	Intrav.	0·01 mg.	K. 99 „	G. T.
2198	Subcut.	37·0 mg.	D. 12 „	Cellulitis.
2199	Subcut.	10·0 mg.	D. 6 „	Death from injuries.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
3623	Intrap.	0·1 mg.	D. 20 days	G. T.
3624	Subcut.	0·1 mg.	D. 33 „	G. T.

VIRUS H. 122. "F.P."—*continued.*

CULTURE INOCULATIONS—*continued.*

II.—April 29, 1909.

The strain was derived from the same source, and had been 66 days in artificial cultivation. The culture used was the 7th generation, 3 days old.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2338	Subcut.	10·0 mg.	K. 106 days	Local lesion ; slight T. of lungs and a tracheal gland.
2339	Subcut.	10·0 mg.	K. 106 ,,	Local lesion ; slight T. of lungs and kidneys.

VIRUS H. 123. "W.W."

SPUTUM.

CULTURE INOCULATIONS.

March 22, 1909.

The strain was derived from the original material through Guinea-pig 3450 (manubrial gland) and had been 25 days in artificial cultivation. The culture used was the 3rd generation, 9 days old.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2208	Intrav.	0·1 mg.	D. 14 days	Early G. T.
2209	Intrav.	0·01 mg.	K. 101 ,,	One tubercle in lung only.
2210	Subcut.	21·0 mg.	K. 101 ,,	Local lesion and slight T. of lungs.
2211	Subcut.	10·0 mg.	K. 101 ,,	

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
3635	Intrap.	0·1 mg.	D. 22 days	G. T.
3636	Subcut.	0·1 mg.	D. 68 ,,	G. T.

VIRUS H. 124. "M.M."
SPUTUM.

CULTURE INOCULATIONS.

I.—March 25, 1909.

The strain was derived from the original material through Guinea-pig 3452 (manubrial gland) and had been 27 days in artificial cultivation. The 3rd generation of culture was used, 9 days old.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2212	Intrav.	0·1 mg.	K. 100 days	G. T.
2213	Intrav.	0·01 mg.	K. 100 ,,	G. T. (not severe).
2214	Subcut.	39·0 mg.	K. 100 ,,	Local T., T. of lungs and kidneys.
2215	Subcut.	10·0 mg.	K. 100 ,,	G. T. progressive in the thorax.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
3637	Intrap.	0·1 mg.	D. 25 days	G. T.
3638	Subcut.	0·1 mg.	D. 44 ,,	G. T.

RABBITS

Inoculated with culture derived from the spleen of Rabbit 2212, on August 25, 1909. The 4th generation of culture was used when 8 days old.

Number.	Method.	Dose.	Duration of Life.	Result.
2421	Intrav.	0·01 mg.	K. 142 days	Slight T. of lungs and omentum.
2422	Intrav.	0·01 mg.	K. 142 ,,	T. of lungs and very slight T. of kidneys.
2423	Subcut.	10·0 mg.	K. 142 ,,	Local T. and slight T. of lungs.

RABBITS

Inoculated with culture derived from the lung of Rabbit 2214, on August 25, 1909. The 4th generation of culture was used when 8 days old.

Number.	Method.	Dose.	Duration of Life.	Result.
2424	Intrav.	0·01 mg.	K. 142 days	T. of lungs and slight T. of kidneys.
2425	Intrav.	0·01 mg.	K. 142 ,,	T. of lungs and slight T. of kidneys.
2426	Subcut.	10·0 mg.	D. 68 ,,	Local T. and slight T. of lungs.

RABBITS

Inoculated with culture derived from the lung of Rabbit 2215, on August 25, 1909. The 4th generation of culture was used when 8 days old.

Number.	Method.	Dose.	Duration of Life.	Result.
2427	Intrav.	0·01 mg.	D. 62 days	G. T.
2428	Intrav.	0·01 mg.	D. 66 ,,	G. T.
2429	Subcut.	10·0 mg.	D. 37 ,,	G. T. not severe.

CULTURE

Derived from the spleen of Rabbit 2427. Inoculated on December 15, 1909, after 50 days artificial cultivation. The culture used was the 3rd generation, 15 days old.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2489	Subcut.	10·0 mg.	K. 91 days	Local T. and slight T. of lungs and kidneys.
2490	Subcut.	10·0 mg.	K. 91 ,,	
2491	Subcut.	10·0 mg.	K. 91 ,,	

CULTURE

Derived from the popliteal gland of Rabbit 2427. Inoculated on December 15, 1909. The culture used was the 3rd generation, 15 days old.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2492	Subcut.	10·0 mg.	K. 91 days	Local T. and slight T. of lungs.
2493	Subcut.	10·0 mg.	K. 91 ,,	Local T., T. of lungs, and slight T. of kidneys.
2494	Subcut.	10·0 mg.	D. 84 ,,	Slight G. T.

CULTURE

Derived from the testis of Rabbit 2428. Inoculated on December 15, 1909, after 46 days artificial cultivation. The culture used was the 3rd generation, 15 days old.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2495	Subcut.	10·0 mg.	D. 38 days	Early slight G. T.
2496	Subcut.	10·0 mg.	K. 92 ,,	Local T. and slight T. of lungs and kidneys.
2497	Subcut.	10·0 mg.	K. 92 ,,	

VIRUS H. 124. "M.M."—*continued.*

CULTURE INOCULATIONS—*continued.*

II.—SEPTEMBER 1, 1909.

The strain was derived from the original material through Guinea-pig 3452 and had been 160 days artificial cultivation.

The culture used was the 12th generation, 13 days old.

CALF 1603.

Subcutaneous.
Dose : 200·0 mg.
Killed : December 3, 1909.
93 days.
P.M.—Very slight generalised tuberculosis.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2435	Subcut.	10·0 mg.	K. 142 days	Local lesion, slight T. of lungs, one tubercle in a kidney.
2436	Subcut.	10·0 mg.	K. 142 ,,	Local lesion and very slight T. of lungs and kidneys.

CALF 1603. Virus H. 124. "M.M."

Subcutaneous inoculation of culture derived from the original material through Guinea-pig 3452.

Dose—200·0 milligrammes.

Date of Inoculation—September 1, 1909. [Age 5 months.]

Killed when in good health—December 3, 1909. [93 days after inoculation.]

Clinical Notes.

The calf remained well, and increased normally in size and weight.

Temperature.

The period of pyrexia following the inoculation was unusually prolonged; it commenced on the 5th day (temperature 40·1° C.) and lasted 41 days; during the first 21 days of this period the temperature did not fall below 40·0° C. (maximum 40·5°); during the following 20 days the temperature gradually fell to the normal.

The temperature subsequently remained normal.

Tuberculin Test.

October 29, 1909. [58 days after inoculation.] Dose, 2·0 cc. Reacted. Rise of temperature, 2·3° C.

Weights.

		cwt.	qrs.	lbs.
September 1, 1909	...	1	3	4
December 3, 1909	...	2	1	16

Total gain of weight.—2 qrs. 12 lbs.

Average rate of gain per week.—5·1 lbs.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Local Lesion.—The tumour at the seat of inoculation on the left side of the neck consisted of greatly thickened skin containing a depressed scar, and a subcutaneous mass 8 cm. in greatest diameter and 1·5 cm. in thickness, of translucent fibroid tissue containing scattered calcareous grains.

Left Prescapular Gland.—The left prescapular gland measured 10 by 5 by 4·5 cm. and was tuberculous practically throughout; the greater part of the gland was composed of breaking down caseous substance while the rest was brownish fibroid and beset with calcareous grains; the capsule was much thickened.

Right Prescapular Gland.—The right prescapular gland measured 7 by 2·5 by 1·2 cm. and was normal on section.

Prepectoral and Cervical Glands.—Normal.

Thorax.

Lungs.—The lungs were crepitant throughout. They showed under the pleura scattered miliary tubercles with calcareo-caseous or calcareous centres and about an equal number of very minute grey foci some of which were calcareous. Similar tubercles were seen on section, sparsely scattered; in the depth of the left caudal lobe there was a small fibroid lobule containing calcareous grains.

Abdomen.

Spleen.—The trabeculae were thickened, otherwise the spleen was normal.

Liver.—On the anterior surface were many hemispherical pits at the bottom of a few of which a yellow focus was seen in the liver substance. Yellow foci up to 1 mm. in diameter were seen sparsely scattered throughout the substance of the liver under the capsule as well as in the depth; in the depth one millet-seed-sized fibrous tubercle was found. No tubercle bacilli were seen in a smear from the foci and their origin was doubtful.

Portal Glands.—These contained scattered irregular calcareo-caseous foci.

A pancreatic gland contained similar foci.

Alimentary Tract.

Small Intestines.—Four Peyer's patches contained one or two soft yellow foci, some gritty.

Mesenteric Glands.—In the cortices were sparsely scattered calcareous or calcareo-caseous foci and an occasional caseo-calcareous tubercle up to a millet seed in size.

Ileo-colic Glands.—These contained more numerous foci than the mesenteric and here and there the foci were aggregated together into groups.

The remaining organs and glands were examined and found normal.

Microscopical Examination.

Yellow focus from a Peyer's patch: two tubercle bacilli seen.

VIRUS H. 125. "A.P."

SPUTUM.

CULTURE INOCULATIONS.

MARCH 22, 1909.

The strain was derived from the original material through Guinea-pig 3454 (manubrial gland) and had been in artificial cultivation a total period of 24 days.

The culture used was the 3rd generation, 9 days old.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2204	Intrav.	0·1 mg.	K. 100 days	T. of lungs and kidneys, and of peritoneum (slight).
2205	Intrav.	0·01 mg.	K. 100 „	Slight T. of lungs and a kidney.
2206	Subcut.	21·0 mg.	K. 100 „	Local T. only.
2207	Subcut.	10·0 mg.	K. 100 „	Local T. and very slight T. of lungs.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
3633	Intrap.	0·1 mg.	D. 20 days	G. T.
3634	Subcut.	0·1 mg.	D. 52 „	G. T.

VIRUS H. 126. "A.W."

SPUTUM.

CULTURE INOCULATIONS.

MARCH 25, 1909.

The strain was derived from the original material through Guinea-pig 3456 (sternal gland) and had been 27 days in artificial cultivation.

The culture used was the 3rd generation, 9 days old.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2216	Intrav.	0·1 mg.	K. 102 days	Slight T. of lungs and kidneys.
2217	Intrav.	0·01 mg.	D. 27 „	Miliary T. of lungs. Death from heart disease.
2218	Subcut.	13·0 mg.	K. 102 „	Local lesion, one nodule in lung and one in a kidney.
2219	Subcut.	10·0 mg.	K. 102 „	Local T. only.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
3640	Intrap.	0·1 mg.	D. 14 days	Early slight G. T. insufficient to account for death.
3639	Subcut.	0·1 mg.	D. 35 „	Early G. T. insufficient to account for death.

CULTURE FEEDING EXPERIMENT.

SEPTEMBER 13–15, 1909.

The strain was derived from the original material through Guinea-pig 3456 (sternal gland), and had been 172 days in artificial cultivation.

The culture used was the 14th generation, 21–23 days old.

CATS (Kittens).

Number.	Method.	Dose.	Duration of Life.	Remarks.
73	Fed	They received between them 50·0 mg. on 13th, 50·0 mg. on 14th, and 14·0 mg. on 15th September.	K. 99 days	No tuberculosis.
75	Fed		K. 99 „	No tuberculosis.
77	Fed		K. 99 „	No tuberculosis.

KITTENS 73, 75, and 77. Virus H. 126. "A.W."

Fed with culture derived from human sputum through Guinea-pig 3456.

Doses and Dates of Feeding—The kittens received between them, in milk, 50·0 milligrammes on September 13, 1909, 50·0 milligrammes on September 14, and 14·0 milligrammes on September 15, 1909.

Killed when in good health—December 21, 1909. [99 days after first feeding.]

Weights.

	(73)	(75)	(77)
September 13, 1909	1050 gr.	1070 gr.	1000 gr.
December 21, 1909	1700 gr.	2050 gr.	1500 gr.

POST-MORTEM EXAMINATION.

All the organs and glands were examined in each case and no sign of tuberculosis was found.

VIRUS H. 127. "R.R." (*a*)

SPUTUM.

CULTURE INOCULATIONS.

I.—APRIL 5, 1909.

The strain was derived from the original material through Guinea-pig 3474 (manubrial gland) and had been 38 days in artificial cultivation. The culture used was the 5th generation, 9 days old.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
3671	Intrap.	0·1 mg.	D. 14 days	G. T.
3672	Subcut.	0·1 mg.	D. 33 „	G. T.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2271	Intrav.	0·1 mg.	D. 15 days	General miliary T.
2270	Intrav.	0·01 mg.	D. 30 „	G. T.
2273	Subcut.	10·0 mg.	D. 40 „	G. T.
2272	Subcut.	5·0 mg.	D. 47 „	G. T.

VIRUS H. 127. "R.R." *(a)—continued.*

II.—May 26, 1909.

The strain was derived from the same source and had been 89 days in artificial cultivation. The culture used was the 10th generation, 19 days old.

CALF 1585.
Subcutaneous.
Dose : 50·0 mg.
Killed : July 13, 1909 (when very ill).
48 days.
P.M.—General tuberculosis.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2356	Subcut.	10·0 mg.	D. 53 days	G. T.
2357	Subcut.	10·0 mg.	D. 41 „	G. T.

III.—June 28, 1909.

The strain was derived from the original material through Guinea-pig 3475 (liver) and had been 120 days in artificial cultivation. The culture used was the 8th generation, 14 days old.

CALF 1569.
Subcutaneous.
Dose : 50·0 mg.
Killed: October 11, 1909 (when well).
105 days.
P.M.—Slight general tuberculosis, apparently retrogressive.

RHESUS MONKEY 337.
Subcutaneous.
Dose : 1·0 mg.
Died: July 25, 1909.
27 days.
P.M.—General tuberculosis, severe.

RHESUS MONKEY 339.
Subcutaneous.
Dose : 1·0 mg.
Died : August 10, 1909.
43 days.
P.M.—General tuberculosis, severe.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2380	Subcut.	10·0 mg.	D. 52 days	G. T.
2381	Subcut.	10·0 mg.	D. 58 „	G. T.

CALF 1585. Virus H. 127. "R.R." *(a).*

Subcutaneous inoculation of culture derived from the original material through Guinea-pig 3474.

Dose—50·0 milligrammes.

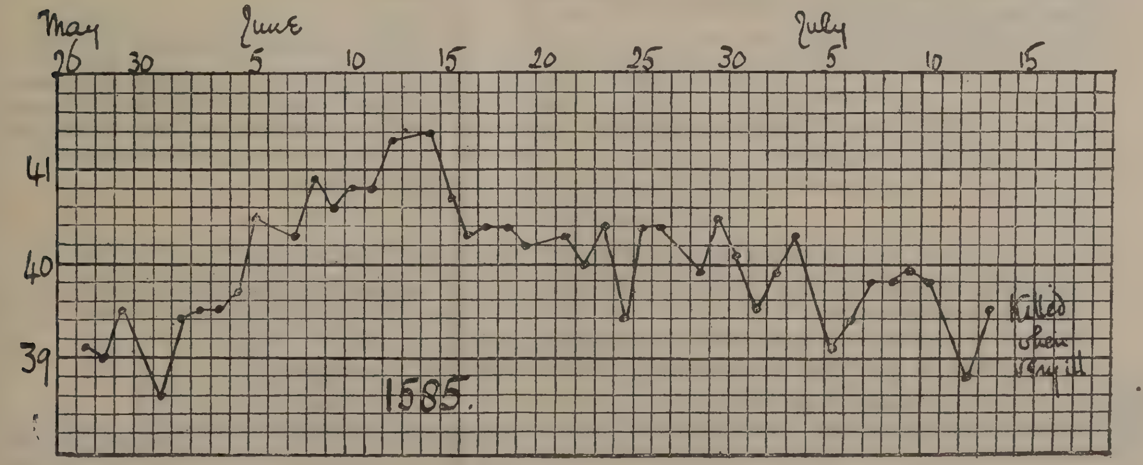
Date of Inoculation—May 26, 1909. [Age about 14 weeks.]

Killed when very ill—July 13, 1909. [48 days of after inoculation.]

Clinical Notes.

The course of the disease was similar to that frequently seen after the subcutaneous inoculation of 50·0 mg. of virulent tubercle bacilli. The calf gradually lost appetite and weight and finally became very emaciated ; the respiration was not markedly affected.

Temperature.



Weights.

	cwt.	qr.	lbs.
May 26, 1909	1	1	2
July 13, 1909	1	0	14

Total loss of weight.—16 lbs.

Average rate of loss per week.—2·3 lbs.

POST-MORTEM EXAMINATION.

The carcass was emaciated.

Local Lesion.—At the seat of inoculation on the left side of the neck there was a firm swelling measuring 15 by 9 by 3·5 cm. (including skin); it was composed of greatly thickened skin (1 cm. in greatest thickness) and a mass of pinkish-yellow caseo-necrotic substance containing an irregular cavity filled with serous fluid; the skin over this cavity was infiltrated in its deeper layers; the muscles also were infiltrated.

Left Prescapular Gland.—The left prescapular gland measured 9 by 5 by 4 cm., and was dense yellow and caseo-necrotic throughout and slightly gritty from calcification.

Right Prescapular Gland.—The right prescapular gland measured 4·3 by 2 by 1 cm. and contained about half-a-dozen caseous tubercles.

Prepectoral Glands.—On the right side one contained a few caseous tubercles. On the left side one the size of a thrush's egg was dense and caseous throughout, another showed about three-quarters of its cortex caseating.

Cervical Glands.—On the left side the lower cervical was the size of a pullet's egg and resembled on section the left prescapular gland. The other cervical glands were not enlarged and contained discrete caseous tubercles and here and there a caseous nodule up to a hemp seed.

Thorax.

Lungs.—The lungs were heavy, weighing 6 lbs. 3 ozs., and firm; their surfaces, except the dorsal surfaces of the caudal lobes, were closely studded with slightly raised grey nodules varying up to 4 mm. in diameter; there were no large continuous areas of consolidation but individual nodules and groups of nodules were surrounded by irregular red patches of hepatisation largest and most extensive in the anterior lobes, pieces from which sank in water; the nodules were everywhere becoming aggregated together in groups and many had coalesced; on section the parenchyma was closely beset with caseating nodules and many of the lobules or parts of lobules in all the lobes were solid and caseating.

Thoracic Glands. — The dorsal mediastinal and bronchial glands were much enlarged weighing together 10 ozs.; they were firm and their cortices were composed of grey translucent tissue mottled with irregular caseous foci and patches forming in places a coarse network.

Heart.—In the muscle wall of the heart there were two caseating nodules the largest the size of a hemp seed.

Pleura.—On the costal pleura there were a few minute haemorrhagic loosely attached tubercles.

Pharynx.—In the corrugated mucous membrane of the pharynx there were a few caseous nodules and there were one or two in the soft palate.

Trachea.—The mucous membrane showed two small congested tuberculous patches.

Larynx.—Normal.

Abdomen.

Omentum and Peritoneum.—There was a millet-seed-sized grey tubercle on the omentum.

The parietal peritoneum was normal.

Spleen.—The spleen was enlarged; the pulp was moderately closely beset with yellow caseous nodules with grey margins varying from 1 to 3 mm. in diameter; the majority were about 2 mm.

Liver.—The liver showed on the surface a moderate number of evenly distributed tubercles ranging up to 2 mm. in diameter; the latter projected slightly from the surface and were flattened out; all except the smallest were caseous in the centre.

On section the substance showed moderately numerous tubercles ranging from a mere point up to about 1 mm. in diameter; the smallest ones were grey, the rest were caseous.

Portal Glands.—The portal glands were enlarged; the cortices were replaced by firm lobular grey areas containing caseous foci.

Coeliac Glands.—All were enlarged; one was firm and composed of grey tissue closely infiltrated with a coarse caseous network; the rest were beset with more or less discrete caseous tubercles with grey margins.

Kidneys.—In the cortex of each kidney there were about a dozen tubercles with caseous centres, the largest rather larger than a millet-seed; there were besides a few smaller grey tubercles which were not centrally caseous.

Suprarenal Bodies.—The left was normal. In the cortex of the right there was one miliary grey tubercle.

Renal Glands.—These were enlarged and closely beset with coalescing caseating tubercles.

Lumbar Glands.—The lumbar glands were slightly enlarged and contained numerous caseating tubercles.

Iliac Glands.—Each contained a moderate number of discrete caseating tubercles up to 2 mm. in diameter.

Alimentary Tract.

Tongue, Tonsils.—Normal.

The Submaxillary and Retro-pharyngeal Glands contained numerous caseous nodules varying up to 2·5 mm. in diameter, and in places confluent.

The Parotideal Glands contained scattered caseous tubercles.

Intestines.—Every Peyer's patch in the small intestine contained scattered caseous nodules varying from a millet seed to a split hemp seed in size; some contained only one or two, others a moderate number. The mucous membrane of the large intestine showed a moderate number of raised grey nodules with a small central ulcer (ulcerated lymphoid nodules).

Mesenteric Glands.—The mesenteric glands were all slightly enlarged; the glands at the extremities of the mesentery were more severely affected than those in the middle, and their cortices were extensively replaced by caseating patches irregular in size and outline; the other glands contained discrete caseating nodules and irregular caseating patches.

Ileo-colic Glands.—The ileo-colic glands were enlarged and firm, and composed of grey tissue beset with caseous nodules.

Testes.—Normal.

Various Lymphatic Glands.

The Precrural, Popliteal, Gluteal, Ischiatic, Pudic, and Axillary Glands showed in their cortices scattered caseating tubercles and nodules, the majority the size of a millet seed, the rest ranging up to a hemp-seed.

CALF 1569. Virus H. 127. "R.R." (*a*).

Subcutaneous inoculation of culture derived from the original material through Guinea-pig 3475.

Dose—50·0 milligrammes.

Date of Inoculation—June 28, 1909. [Age about 12 weeks.]

Killed when in good health—October 11, 1909. [105 days after inoculation.]

Clinical Notes.

The calf remained well and grew normally during the experiment.

Temperature.

The temperature rose to 39·9° C. on the 7th day and reached a maximum of 40·7° C. on the 11th day;

it then gradually declined to the normal; the pyrexia lasted 34 days in all. Subsequently the temperature was normal.

Tuberculin Test.

August 6, 1909. [39 days after inoculation.] Dose, 1·0 cc. Reacted. Rise of temperature, 1·1° C.

Weights.

	cwt.	lbs.
June 28, 1909	1	15
October 11, 1909	2	5

Total gain of weight.—3 qrs. 18 lbs.

Average rate of gain per week.—7 lbs.

POST-MORTEM EXAMINATION.

The carcass was fat.

Local Lesion.—On the left side of the neck there was a firm tumour measuring 14 by 6 cm. in area, composed of thickened skin and a subcutaneous patch 1·5 cm. in thickness of pinkish fibroid tissue containing calcareous foci; the skin showed in the centre a funnel-shaped depression with a small dry ulcer at its apex (this lesion represented an abscess which had opened and discharged its caseo-purulent contents 35 days before death).

Left Prescapular Gland.—The left prescapular gland measured 6·3 by 3·4 by 2·8 cm. and showed more than three-quarters of its substance composed of dense caseous substance and the rest of fibroid tissue containing calcareous foci.

Right Prescapular Gland.—The right prescapular gland measured 5 by 2·2 by 1 cm. and showed a few caseous nodules up to 3 mm. in diameter which readily shelled out.

Prepectoral Glands.—One on the left side contained a calcareous tubercle and one on the right a minute calcareous focus; the rest were normal.

Cervical Glands.—All were normal in size; one contained a calcareous patch, the others, with two exceptions which were normal, contained a varying number, from one to about half a dozen, of caseous gritty tubercles.

Thorax.

Pleura and Heart.—Normal.

Lungs.—The lungs were crepitant and collapsed normally; they showed under the pleura a moderate number of tubercles varying from a point up to about 2 mm. in diameter; the smaller ones were grey and translucent, the larger ones caseous and calcareous; similar tubercles were seen on section but they appeared less numerous than on the surface; besides the tubercles there were scattered irregular patches which were small consolidated lobules; these were composed of reddish fibroid tissue closely beset with calcareous or (occasionally) calcareo-caseous foci.

Thoracic Glands.—The bronchial and dorsal mediastinal glands were normal in size; they showed on section scattered calcareous foci and irregular patches composed of aggregated calcareous foci.

Abdomen.

Omentum and Peritoneum.—On the ventral surface of the omentum there were about half a dozen fibrous tubercles one of which had a calcareous centre. The parietal peritoneum was normal.

Spleen.—The spleen pulp contained a moderate number of spherical caseo-calcareous tubercles 1 to 2 mm. in diameter; forty-six were counted on an area of the cut surface 5 cm. square.

Liver.—The substance contained scattered tubercles with calcareous centres and grey margins ranging up to 1 mm. in diameter.

Portal Glands.—The portal glands were normal in size and showed on section a moderate number of irregular calcareous tubercles.

Kidneys and Suprarenal Bodies.—Normal.

Coeliac Glands.—These were not enlarged; one showed irregular calcareous patches in the cortex, the other a calcareous tubercle or two.

Alimentary Tract.

Tongue, Pharynx, Palate, Tonsils.—Normal.

The Retro-pharyngeal, Submaxillary, and Parotideal Glands contained tubercles similar to those in the precrural glands; they were not, however, quite so numerous.

Intestines.—Two Peyer's patches contained each one calcareous tubercle. The large intestine was normal.

Mesenteric and Ileo-colic Glands.—These were normal in size and each contained scattered irregular calcareous tubercles.

Various Lymphatic Glands.

The Precrural, Popliteal, and Iliac Glands showed in the cortices a moderate number of discrete caseous slightly gritty tubercles ranging from 1 to 2 mm. in diameter, the majority rather more than 1 mm.

The Renal and Lumbar, Supramammary, Gluteal, Ischiatic, and Axillary Glands each contained a few minute calcareous foci with, in some cases, a larger caseo-calcareous tubercle.

Haemo-lymph Glands.—One was found to contain a minute calcareous tubercle.

Eyes.—Normal.

Udder.—The udder was well formed but was not very large. Thin grey purulent fluid was readily expressed from the teat of the right hind quarter and small quantities were obtained from the two fore quarters. None was obtained from the left hind quarter which was washed out with salt solution.

On section of the udder the milk sinuses and ducts of the right hind quarter were filled with pus but there was only a small quantity in the two fore quarters; the mammary tissue showed no naked-eye evidence of tuberculosis.

Microscopical Examination.

Pus from right hind quarter of udder.—A few tubercle bacilli.

Pus from left fore quarter of udder.—A few tubercle bacilli.

Pus from right fore quarter of udder.—A few tubercle bacilli.

Washings from left hind quarter of udder.—No tubercle bacilli.

The pus contained numerous leucocytes, many breaking down, vacuolated alveolar cells, and amorphous débris.

RHESUS MONKEY 337. Virus H. 127. "R.R." (*a*).

(A young animal.)

Subcutaneous inoculation of culture derived from the original material through Guinea-pig 3475.

Dose—1·0 milligramme.

Date of Inoculation—June 28, 1909.

Died—July 25, 1909. [27 days after inoculation.]

POST-MORTEM EXAMINATION.

The carcass was emaciated. Its weight was 1,550 grammes.

Local Lesion.—The skin over the posterior ribs on the left side showed a circular ulcer 3 cm. in diameter with dry caseous floor and undermined everted haemorrhagic margins.

Axillary Glands.—On the left side there was a group of about half-a-dozen enlarged caseous and softened glands.

On the right side one the size of a bean was caseous throughout; two other smaller ones were partly caseous.

Cervical Glands.—In the left posterior triangle three glands, the largest 4 mm. in diameter, were caseous throughout; an upper cervical gland on this side contained two miliary caseous tubercles; the glands on the right side were normal.

Vertebral Glands.—On each side in the middle of the back there were four enlarged completely caseous glands each about the size of a large pea. Opposite the third interspace on the left side there was a caseous gland the size of a bean and the left ventral mediastinal gland was also enlarged and caseous.

Thorax.

Lungs.—The lungs were crepitant and contained scattered caseous tubercles up to a millet seed in size.

Bronchial Glands.—The bronchial glands were slightly enlarged and showed in the cortices discrete caseous tubercles.

Heart and Pleura.—Normal.

Abdomen.

Omentum and Peritoneum.—The omentum contained scattered minute grey tubercles. The peritoneum was normal.

Spleen.—The spleen was enlarged, measuring 5·5 by 3·2 cm. and closely beset with yellow caseous coalescing nodules varying up to 2 mm. in diameter.

The Splenic Lymphatic Glands were slightly enlarged and contained discrete caseous tubercles.

Liver.—The liver was enlarged, pale, and closely beset with caseous tubercles up to a millet seed in size.

The Gland on the head of the Pancreas was enlarged and its cortex beset with coalescing caseous nodules. Some other glands in the pancreas also contained caseous nodules.

Kidneys.—In the cortex of each kidney there were sparsely scattered caseous tubercles ranging up to a millet-seed in size.

The Lumbar, Iliac, Inguinal and Mesenteric Glands were slightly enlarged and contained discrete caseous miliary tubercles.

Ileo-colic and Colic Glands.—The ileo-colic glands showed one or two caseous tubercles. A few colic glands contained a caseous tubercle or two.

Submaxillary and Retro-pharyngeal Glands.—The submaxillary glands on each side contained each a few miliary caseous tubercles, and each pharyngeal gland contained two or three miliary caseous tubercles.

The remaining organs and glands were examined and found normal.

RHESUS MONKEY 339. Virus H. 127. "R.R." (*a*).

(A young animal.)

Subcutaneous inoculation of culture derived from the original material through Guinea-pig 3475.

Dose—1·0 milligramme.

Date of Inoculation—June 28, 1909.

Died—August 10, 1909. [43 days after inoculation.]

POST-MORTEM EXAMINATION.

The carcass was emaciated. The weight at death was 2,050 grammes.

Local Lesion.—The skin over the last few ribs showed an ulcer measuring 2·5 by 1·5 cm. in area with dry haemorrhagic caseous floor and thin undermined margins; on section through the skin the ulcer was found to be situated over the posterior part of a flat subcutaneous caseous tumour measuring 5 by 4 by 0·5 cm.

Axillary Glands.—Three glands on the right side, each 1 cm. in diameter, were caseous throughout, another contained three caseous nodules.

On the left side one the size of a large pea was caseous throughout, two others contained a caseous nodule or two.

Cervical Glands.—In the right posterior triangle two the size of small peas were caseous throughout; one in the middle of the neck on this side contained a millet-seed-sized caseous tubercle.

On the left side one in the middle of the neck contained a caseous tubercle.

Vertebral Glands.—On the right side the glands from the 7th to the 11th interspaces were enlarged and caseous throughout.

On the left side one gland in the 7th interspace was caseous throughout; three other glands contained discrete caseous nodules.

Thorax.

The pleural cavities and the pericardial sac were filled with clear serous fluid.

Lungs.—The lungs were voluminous, generally much firmer than normal, and showed many irregular airless patches.

The right lung was firmly adherent to the enlarged vertebral glands and was covered with a layer of fibrin which sent numerous processes to the costal pleura.

The lung parenchyma contained numerous evenly-distributed caseous tubercles ranging from 1 up to 3·5 or more millimetres in diameter.

Bronchial Glands.—Not examined.

Heart.—Normal.

Abdomen.

The peritoneal cavity was filled with clear serous fluid.

Omentum.—The omentum was congested and closely beset with small caseous tubercles.

Peritoneum.—Normal.

Spleen.—The spleen was greatly enlarged, measuring 7·5 by 4 by 2·5 cm., and its pulp was closely beset and almost completely replaced by yellow caseous and softened nodules varying up to 4 mm. in diameter.

The splenic lymphatic glands were slightly enlarged and contained caseous nodules.

Liver.—The liver was enlarged, pale, and covered with a thin layer of fibrin which was readily peeled off. Its substance contained numerous evenly-distributed caseous nodules, varying in size from a mere point up to 2·5 mm. in diameter.

Two glands on the head of the pancreas were much enlarged and their cortices entirely composed of coalescing caseous and softened nodules.

The pyloric gland was enlarged and contained three caseous nodules up to a hemp seed in size.

Kidneys.—Each kidney showed in the cortex half a dozen caseous tubercles up to a millet seed in size.

Suprarenal Bodies.—Normal.

Lumbar Glands.—The lumbar glands were enlarged and contained caseous nodules.

Iliac Glands.—Normal.

Alimentary Tract.

Tongue, Pharynx, Tonsils.—Normal.

Submaxillary Glands.—These glands contained caseous nodules up to a hemp seed in size.

Retro-pharyngeal Glands.—Normal.

Intestines.—There was a caseous tubercle or two in the walls of the small intestines and also in those of the large.

Mesenteric, Ileo-colic, and Colic Glands.—The mesenteric glands contained a few small caseous nodules; one colic gland was caseous; the ileo-colic glands were normal.

Inguinal Glands.—One on the right side the size of a pea was caseous almost throughout; three others contained each a small caseous nodule.

The glands on the left side contained four caseous nodules.

VIRUS H. 127. "R.R." (*b*).
SPUTUM.

CULTURE INOCULATIONS.

I.—July 7, 1909.

The strain was derived from the original material through Guinea-pig 3742 (sternal gland) and had been 41 days in artificial cultivation. The culture used was the 4th generation, 8 days old.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2392	Subcut.	10·0 mg.	D. 50 days	G. T.
2391	Subcut.	8·0 mg.	D. 54 „	G. T.

II.—July 7, 1909.

The strain was derived from the original material through Guinea-pig 3743 (manubrial gland) and had been 50 days in artificial cultivation. The culture used was the 4th generation, 8 days old.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
3803	Intrap.	0·1 mg.	D. 18 days	Acute T.
3804	Subcut.	0·1 mg.	D. 54 „	Severe G. T.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2389	Subcut.	10·0 mg.	D. 60 days	G. T.
2390	Subcut.	10·0 mg.	D. 50 „	G. T.
2388	Subcut.	5·0 mg.	D. 54 „	G. T.

VIRUS H. 127. "R.R." (*c*.)
SPUTUM.

CULTURE INOCULATION.

October 2, 1909.

The strain was derived from the original material direct and had been 115 days in artificial cultivation. The culture used was the 8th generation, 23 days old.

CALF 1595.

Subcutaneous.

Dose: 50·0 mg.

Killed when dying: Nov. 16, 1909.

45 days.

P.M.—General tuberculosis.

CALF 1593.

Subcutaneous.

Dose: 50·0 mg.

Killed when very ill: Nov. 5, 1909.

34 days.

P.M.—General miliary tuberculosis.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2460	Subcut.	1·0 mg.	D. 117 days	G. T.
2461	Subcut.	5·0 mg.	D. 56 „	G. T.

CALF 1595. Virus H. 127. "R.R." (*c*).

Subcutaneous inoculation of culture derived from the original material direct.

Dose—50·0 milligrammes.

Date of Inoculation—October 2, 1909. [Age about 13 weeks.]

Killed when dying—November 16, 1909. [45 days after inoculation.]

Clinical Notes.

The course of the disease was similar to that usually seen in calves after the subcutaneous inoculation of 50·0 mg of a virulent culture.

Temperature.

The temperature curve was typical of a severe tuberculous infection. On the 9th day 39·7° C. was recorded, and on the following day 40·5° C. The temperature remained high (at 40·0° C. or thereabouts) until the day the calf was killed when it fell suddenly to 38·6° C.

Weights.

	cwt.	qrs.	lbs.
October 2, 1909	1	0	21
November 16, 1909	1	0	9

Total loss of weight.—12 lbs.

POST-MORTEM EXAMINATION.

The carcass was emaciated.

Local Lesion.—The local lesion was a lenticular mass of firm pinkish-yellow caseo-necrotic substance measuring 14 by 13 by 5·4 cm., intimately adherent to and infiltrating skin and muscles.

Left Prescapular Gland.—The left prescapular gland measured 11 by 5 by 4·8 cm. and was dense and caseous throughout. A thick caseous cord extended between it and the local lesion.

Right Prescapalar Gland.—The right prescapular gland measured 4·9 by 2 by 0·8 cm. and contained numerous caseous nodules mostly about 2 mm. in diameter.

Prepectoral Glands.—On the left side one 1·5 cm. in diameter was caseous throughout, another was partly caseating, a third contained caseating patches and discrete tubercles, and two others showed a few minute tubercles. Those on the right side contained a few discrete caseous tubercles.

Cervical Glands.—On the left side there were six enlarged glands, two in the upper and four in the lower part of the neck, ranging in size up to a thrush's egg, which were dense and caseating practically throughout; the rest on this side and all those on the right contained discrete caseous tubercles.

On the left side of the trachea, just within the entrance to the thorax, there was a large gland which resembled the left prescapular gland on section.

Thorax.

Pleura.—In the fringes along the margins of the ribs there were many small tubercles. There were a few on the pleura covering the diaphragm.

Lungs.—The lungs were large and heavy, weighing 6¼ lbs.; the surfaces, except under the thicker pleura on the dorsal surfaces of the caudal lobes, were closely studded with raised grey nodules ranging from 1·5 up to 3 and occasionally more millimetres in diameter. The small anterior lobes and much of the caudal lobes were consolidated, the latter diffusely.

On section the lung parenchyma was very closely beset with caseating nodules showing the same range of variation in size as those on the surface. In the caudal lobes there were besides the nodules many solid caseating lobules. The bronchi were filled with mucus.

Thoracic Glands.—The dorsal mediastinal and bronchial glands were moderately large and showed their cortices composed of firm grey tissue closely mottled with irregular caseous patches having in places a moss-like appearance.

Heart.—There were a few minute greyish-white tubercles on the endocardium of the right auricle and two or three on that of the right ventricle.

Abdomen.

Omentum and Peritoneum.—On the ventral surface of the omentum there were about half-a-dozen small lenticular reddish nodules.

The parietal peritoneum was normal.

Spleen.—The spleen was slightly enlarged, the pulp was closely beset with caseous tubercles, the majority 1·5 to 2 mm. in diameter.

Liver.—On the surface of the liver there was a moderate number of slightly raised flattened "mushroomed" nodules ranging up to 3 mm. in diameter; these were caseous in the centre, grey around the margins. In the depth of the liver there were moderately numerous evenly-distributed caseous tubercles ranging up to a millet seed in size.

Portal Glands.—The portal glands were two or three times the normal in size and showed in the cortices numerous caseous tubercles occurring here and there in groups.

Coeliac Glands.—Two were enlarged and closely beset with irregular caseous tubercles, three others contained caseous tubercles in smaller numbers.

Kidneys.—On the surface of each kidney there were caseous nodules with grey margins ranging from 1 to 2·5 mm. in diameter; on section many were elongated and penetrated the cortex deeply. Twenty-four were counted on the surface of the left and there were some in the depth; they were rather less numerous in the cortex of the right; in the latter there was a wedge-shaped caseous nodule measuring 1 cm. in length.

Suprarenal Bodies.—Normal.

Alimentary Tract.

Pharynx.—There were scattered caseous nodules in the corrugated mucous membrane of the vault.

Tonsils.—A few caseous nodules were seen in each tonsil.

Larynx and Trachea.—Normal.

The Submaxillary, Parotideal, and Retro-pharyngeal Glands contained a moderate number of caseous nodules mostly small.

Intestines.—All the Peyer's patches of the small intestine contained scattered caseous tubercles up to a millet seed in size.

The lymphoid follicles of the large intestines were slightly enlarged, congested, and showed central caseation.

Mesenteric and Ileo-colic Glands.—These showed in their cortices a moderate number of small caseous nodules.

Eyes.—Normal.

Mammary Gland.—Normal.

Various Lymphatic Glands.

The Precrural, Popliteal, Pudic, Gluteal, Ischiatic, Iliac, Lumbar, and Renal Glands contained numerous caseous nodules ranging up to 2·5 mm. in diameter.

Each *Axillary Gland* contained a few nodules.

CALF 1593. Virus H. 127. "R.R." (*c*).

Subcutaneous inoculation of culture derived from the original material, direct.

Dose—50·0 milligrammes.

Date of Inoculation—October 2, 1909.

Killed when very ill—November 5, 1909. [34 days after inoculation.]

Clinical Notes.

The calf was very ill when it was killed on Nov. 5 and could not have lived more than a few days longer.

Temperature.

The pyrexia following the inoculation was unusually severe; from the 10th day onwards until the calf was killed on the 34th day the temperature was over 40·2° C., and during this period temperatures of 41·0° C. and over were recorded on eleven successive days (13th to 23rd) the maximum temperature being 41·8° C. on the 20th day.

Weights.

	cwt.	lbs.
October 2, 1909	1	10
November 5, 1909	1	5

Loss of weight.—5 lbs.

POST-MORTEM EXAMINATION.

The carcass was emaciated.

Local Lesion.—The local lesion was a large firm mass, measuring 19 by 11 by 6 cm. and weighing 1 lb. 9 ozs., of caseating tuberculous tissue, involving the muscles to a considerable depth. The tissues around it were very oedematous.

Left Prescapular Gland.—The left prescapular gland measured 10·5 by 6 by 4 cm. and was dense and caseating throughout, parts being uniformly caseous, parts still grey but very closely beset with caseous foci and a fine network.

Right Prescapular Gland.—The right prescapular gland measured 4·5 by 2 by 1·2 cm. and showed in the cortex numerous caseous tubercles confluent in places.

Prepectoral Glands.—On the left side one the size of a large pea was composed of grey tissue beset with caseous foci, another showed a third of the gland substance in a similar condition; a third gland contained discrete tubercles.

On the right side the glands contained moderately numerous discrete caseous tubercles.

Cervical Glands.—The left lower cervical gland was the size of a pullet's egg and resembled on section the left prescapular gland; one in the middle of the neck on this side and one near the articulation of the jaw showed nearly the whole of their cortices firm grey and beset with caseous foci; all the rest contained discrete caseous tubercles.

Thorax.

Pleura.—On the costal pleura there were scattered caseating nodules similar to those on the omentum; there were a few on the diaphragmatic pleura.

Lungs.—The lungs collapsed only partially; they were firmer than normal but for the most part crepitant; the small anterior lobes were diffusely hepatised and the caudal lobes showed a few dark red consolidated lobules. The parenchyma of the lungs was evenly and moderately closely beset with grey tubercles with caseous centres ranging up to 1·5 mm. here and there confluent; some of the consolidated lobules were becoming uniformly tuberculous, the others appeared more closely beset with tubercles than the crepitant parts.

Thoracic Glands.—The bronchial and dorsal mediastinal glands were moderately enlarged; their cortices were composed of firm grey tissue very closely infiltrated with caseous foci.

Heart.—Normal.

Trachea.—The trachea showed a moderate number of submucous tubercles.

Abdomen.

Omentum.—The omentum showed numerous flattened caseating nodules varying in size from a pin's head to that of a split pea.

The parietal peritoneum was normal.

Spleen.—The spleen was much enlarged and weighed 1 lb. 4 ozs.; the pulp was packed as closely as possible with caseous tubercles aggregated together throughout the organ into small coalescing groups.

Liver.—The liver was enlarged and pale, and showed a moderate number of evenly distributed caseous tubercles ranging from a mere point up to 1 mm. in diameter; many of the smallest ones were seen on the surface as points of congestion.

Portal Glands.—These were slightly enlarged, very oedematous, and showed in the cortex grey patches beset with caseous foci, and discrete caseous tubercles.

Coeliac Glands.—The coeliac glands were slightly enlarged; the cortices of some were firm grey and beset with caseous foci; others showed discrete caseous tubercles.

Kidneys.—The cortex of each showed scattered miliary caseous tubercles on the surface and in the depth.

Suprarenal Bodies.—No tubercles seen.

Alimentary Tract.

Tongue.—Normal.

Tonsils.—The tonsils were closely beset with caseous tubercles.

Pharynx.—In the soft palate and corrugated mucous membrane were numerous caseous tubercles.

The Submaxillary, Retro-pharyngeal, and Parotideal Glands showed in their cortices numerous discrete caseating tubercles varying from 1 to 2 mm. in diameter.

Small Intestines.—Five Peyer's patches in the anterior part showed discrete caseous foci.

Large Intestines.—Normal.

Mesenteric and Ileo-colic Glands.—These glands contained discrete caseous tubercles less numerous than in the peripheral glands.

Eyes.—Normal.

Mamma.—Normal.

Various Lymphatic Glands.

The Precrural, Popliteal, Iliac, Lumbar, Pudic, Gluteal, and Ischiatic Glands showed on their cortices numerous discrete caseating tubercles varying from 1 to 2 mm. in diameter.

The Renal Glands were closely beset with caseous tubercles up to a millet-seed in size, in places confluent.

VIRUS H. 127. "R.R." (*d*).

SPUTUM.

CULTURE INOCULATIONS.

I.—SEPTEMBER 2, 1909.

The strain was derived from the original material through Guinea-pig 3784 (sternal gland), and had been 65 days in artificial cultivation. The culture used was the 4th generation, 12 days old.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2442	Subcut.	10·0 mg.	D. 64 days	G. T.
2443	Subcut.	10·0 mg.	D. 69 „	G. T.
2444	Subcut.	10·0 mg.	D. 31 „	G. T.

II.—OCTOBER 2, 1909.

The strain was derived from the original material direct and had been 115 days in artificial cultivation. The culture used was the 3rd generation, 23 days old.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2459	Subcut.	40·0 mg.	D. 41 days	G. T.
2457	Subcut.	10·0 mg.	D. 56 „	G. T.
2458	Subcut.	10·0 mg.	D. 87 „	G. T.

VIRUS H. 128. "D.D." (*a*).

SPUTUM.

CULTURE INOCULATIONS.

I.—APRIL 23, 1909.

The strain was derived from the original material through Guinea-pig 3584 (sternal gland) and had been 35 days in artificial cultivation. The culture used was the 3rd generation 10 days old.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
3730	Intrap.	0·1 mg.	D. 13 days	Acute T.
3731	Subcut.	0·1 mg.	D. 47 „	G. T.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2313	Intrav.	0·1 mg.	D. 18 days	G. T.
2312	Intrav.	0·01 mg.	D. 24 „	G. T.
2315	Subcut.	30·0 mg.	D. 38 „	G. T.
2314	Subcut.	10·0 mg.	D. 38 „	G. T.

VIRUS H. 128. "D.D." *(a)—continued.*

CULTURE INOCULATIONS—*continued.*

II.—June 4, 1909.

The strain was derived from the original material through Guinea-pig 3584 (sternal gland) and had been 77 days in artificial cultivation. The culture used was the 8th generation, 10 days old.

CALF 1567.

Subcutaneous.
Dose: 45·0 mg.
Killed: July 16, 1909, (when very ill).
42 days.
P.M.—General tuberculosis.

CALF 1579.

Subcutaneous.
Dose: 50·0 mg.
Killed: July 15, 1909 (when dying).
41 days.
P.M.—General tuberculosis.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2362	Subcut.	1·0 mg.	D. 73 days	G. T.
2363	Subcut.	1·0 mg.	D. 41 „	G. T.

CALF 1567. Virus H. 128. "D.D." (*a*).

Subcutaneous inoculation of culture derived from the original material through Guinea-pig 3584.

Dose—45·0 milligrammes.

Date of Inoculation—June 4, 1909. [Age about 9 weeks.]

Killed when very ill—July 16, 1909. [42 days after inoculation.]

Clinical Notes.

The character of the illness was similar to that frequently seen after the inoculation of a virulent virus. The disease in this calf ran a somewhat less acute course than in the fellow calf (1579); it did not become so emaciated, and the respiration up to the 41st day after inoculation was only slightly quickened. On the 42nd day the respiration was more rapid and jerky, the calf was very ill, and could not have lived more than a day or two longer; it was therefore killed.

Temperature.

The day following the inoculation the temperature was 39·2° C., on the 8th day it was 40·4° C., and on the 11th day a maximum of 40·8° C. was reached. The temperature then declined slowly and irregularly until the calf was killed on the 42nd day (when 38·6° C. was recorded); during this period the temperature fluctuated mainly between 39·2 and 40·0° C.

Weights.

	qrs.	lbs.
June 4, 1909	3	23
July 16, 1909	3	22

Total loss of weight.—1 lb.

POST-MORTEM EXAMINATION.

The carcass was thin.

Local Lesion.—At the seat of inoculation on the left side of the neck there was a large firm tumour weighing with attached skin and infiltrated muscle 1 lb. 12 ozs.; it measured 15 by 12 cm. in area and 6 cm. in thickness; on section it showed a lenticular mass of pinkish-yellow caseo-necrotic substance, a layer of infiltrated muscles, and thickened infiltrated skin breaking down in the central part.

Left Prescapular Gland.—The left prescapular gland measured 10 by 6·5 by 5 cm. and was composed throughout of dense pinkish-yellow caseo-necrotic substance; the capsule was much thickened and was adherent to the local lesion.

Right Prescapular Gland.—The right prescapular gland measured 4 by 1·5 by 1 cm. and showed in the cortex scattered caseating nodules up to a hemp-seed in size.

Prepectoral Glands.—On the left side one was 3 cm. in diameter, and was dense and caseo-necrotic throughout. Another nearly as large showed the cortex composed of grey tissue beset with caseous-foci; a third contained a caseous tubercle.

On the right side one spherical gland 1 cm. in diameter was composed of translucent grey tissue containing caseous foci and one large caseous nodule; another contained a few caseous nodules.

Cervical Glands.—On the left side the lower cervical gland was much enlarged, measuring 4·5 cm. in greatest diameter, and was caseating throughout; the cortex was not uniformly caseous, small islands of grey tissue still remaining. Two mid-cervical glands, the largest the size of a broad-bean, were firm, grey, and beset with caseous foci; other cervical glands on this side and all those on the right each contained a few discrete caseating nodules.

Thorax.

Pleura.—Along the margins of the ribs there were several flattened caseating nodules similar to those on the omentum occurring singly and in groups.

On the diaphragmatic pleura there were a few patches of grey granules.

Lungs.—The anterior lobes showed on the surface moderately numerous slightly raised grey nodules with caseous centres ranging up to 3 and 4 mm. in diameter, in places aggregated together, and large irregular red patches of consolidation; the anterior parts of the caudal lobes were similar, the surfaces of the rest of the caudal lobes were mottled with small angular red patches which mainly surrounded individual tubercles; under the pleura there were some flattened-out caseating nodules up to 5 mm.; these did not project above the surface.

On section the parenchyma of the lung was found to be moderately closely and evenly beset with caseating tubercles, the majority not larger than a millet seed; a few larger ones were seen, and these varied up to a hemp seed in size; the tubercles remained discrete and there were no lobular caseating masses.

Thoracic Glands.—The bronchial and dorsal mediastinal glands were enlarged, weighing together 6 ozs.; their cortices were composed of grey translucent tissue containing irregular caseous foci united together in places to form a coarse network.

Heart.—On the endocardium of the right auricle there were half-a-dozen minute pearly-grey tubercles, and under it one millet-seed-sized caseous tubercle. There was one minute grey tubercle on the endocardium of the right ventricle.

Trachea.—The mucous membrane of the trachea showed small scattered greyish caseating nodules, the surfaces of which were ulcerated.

Abdomen.

Omentum and Peritoneum.—On the ventral surface of the omentum there were numerous grey tubercles up to a millet seed in size, and a few larger caseating growths up to 8 mm. in diameter, flattened and lenticular.

On the peritoneal surface of the diaphragm on the right side there were several small flattened grey nodules.

Spleen.—The spleen was much enlarged (weight 13 ozs.) and the pulp was packed almost as closely as possible with firm yellow caseous nodules ranging from 2 to 5 mm. in diameter; in many places the nodules were aggregated together and had become confluent.

Liver.—The liver showed on the surface numerous caseating nodules; some were flattened out and quite superficial with their margins overhanging, these ranged up to 8 mm. in diameter; the greater number however were smaller and just projected or were completely embedded in the liver substance. On section the liver substance showed numerous evenly distributed caseating nodules ranging from a millet to a hemp seed.

Portal Glands.—The portal glands were much enlarged and their cortices were composed of firm grey tissue beset with caseous foci (confluent caseating tubercles).

Coeliac Glands.—The coeliac glands were moderately enlarged and were closely beset with caseous tubercles with grey margins becoming confluent.

Kidneys.—In the cortex of the left kidney, near the surface, sixteen tubercles and nodules were seen; the majority varied up to 2·5 mm. in diameter and were grey with caseous centres; there were two large caseating nodules 4 mm. broad extending through the whole thickness of the cortex slightly into the medulla; a few small tubercles were seen in the depth.

On the surface of the right kidney ten caseating nodules up to 2·5 mm. in diameter were seen.

Suprarenal Bodies.—In the cortex of the left suprarenal there was one miliary caseous tubercle; in that of the right there was one grey tubercle with a caseous centre.

Alimentary Tract.

Tongue.—Normal.

Pharynx.—In the corrugated mucous membrane of the vault of the pharynx there was a hempseed-sized yellow caseating nodule. There was a similar but smaller nodule on the dorsal surface of the soft palate.

Tonsils.—Each tonsil contained a caseous nodule or two.

The Parotideal, Submaxillary, and Retro-pharyngeal Glands contained moderately numerous caseating nodules ranging up to 4 mm. in diameter.

Intestines. — Every Peyer's patch in the small intestine contained a few caseous tubercles; in the long patch they were moderately numerous.

In the large intestine all the lymphoid follicles were enlarged and many showed in the centre a small ulcer with congested margins.

Mesenteric Glands. — All the glands contained nodular patches ranging up to 1 cm. or more in diameter; they were greyish-red and contained irregular caseous foci.

Ileo-colic Glands.—These were enlarged and their cortices were composed of grey tissue containing a caseous network.

Eyes.—Normal.

Mammary Gland.—Normal.

Various Lymphatic Glands.

Precrural Glands. — In the right there were numerous caseating nodules, the largest nearly 3 mm. in diameter, in the left only a moderate number.

Popliteal Glands.—There were a few firm caseating nodules in the cortex of each.

The Pudic, Gluteal, Iliac and Lumbar Glands contained similar nodules.

Axillary Glands. — One was normal, the other showed caseous nodules.

Ischiatic Glands. — One was normal, the other contained one caseous nodule.

CALF 1579. Virus H. 128. "D.D" (*a*).

Subcutaneous inoculation of culture derived from the original material through Guinea-pig 3584.

Dose—50·0 milligrammes.

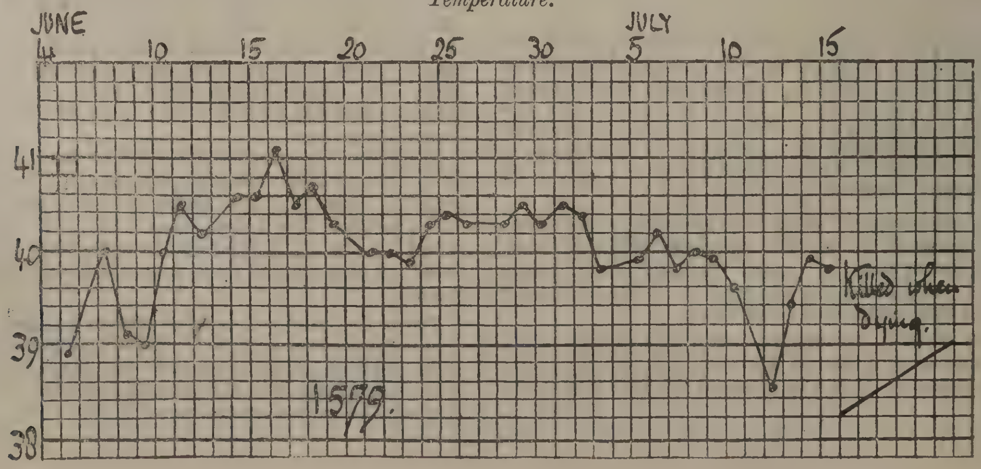
Date of Inoculation—June 4, 1909. [Age 5 months.]

Killed when dying—July 15, 1909. [41 days after inoculation.]

Clinical Notes.

The course of the disease was similar to that usually seen in calves suffering from acute tuberculosis, being marked by extreme weakness and emaciation and difficulty of respiration. The calf was in a dying condition when killed on the 41st day after inoculation.

Temperature.



Weights.

	cwt.	qrs.	lbs.
June 4, 1909	1	3	4
July 15, 1909	1	1	14

Total loss of weight.—1 qr. 18 lbs.

Average rate of loss per week.—7·7 lbs.

POST-MORTEM EXAMINATION.

The carcass was emaciated.

Local Lesion.—At the seat of inoculation on the left side of the neck there was a very large firm tumour weighing with attached skin 3 lbs. and measuring 18 by 14 by 7·5 cm. including skin and infiltrated muscles. It was composed of a lenticular mass of pinkish-yellow juicy necrotic substance 4 mm. in greatest thickness, fibroid muscles closely beset with caseous nodules for a depth of 3 cm., and thickened infiltrated skin which on the surface was fissured and necrotic.

Left Prescapular Gland.—The left prescapular gland weighed 8 ozs. and measured 10 by 6·5 by 4·6 cm.; on section it was dense pinkish-yellow and caseo-necrotic throughout.

Right Prescapular Gland.—The right prescapular gland measured 5·5 by 2·9 by 1·7 cm.; it was very oedematous and contained scattered caseating nodules.

Prepectoral Glands.—On the right side one contained three, another one, caseous nodules. On the left side one, 1 cm. in diameter, was composed of translucent fibroid tissue beset with caseous tubercles; two others contained discrete caseous nodules.

Cervical Glands.—On the left side one in the lower part of the neck was the size of a hen's egg and was dense and caseating throughout, not so advanced as the prescapular gland. Another small one near it was in a similar condition. One in the middle of the neck, and the upper cervical gland on this side, and the lower cervical gland on the right side were enlarged and their cortices composed of reddish-grey tissue closely peppered with caseous foci. The right upper cervical contained numerous caseous nodules.

Other cervical glands contained each a few caseous nodules similar to those in the peripheral glands.

Thorax.

There was an excess of fluid in the pleural cavities.

Pleura.—On the costal pleura there were about half-a-dozen flattened caseating nodules. The pleural surface of the diaphragm showed several pinkish-yellow patches but no nodules.

Lungs.—The lungs were voluminous and heavy, weighing 7 lbs. 7 ozs.; the right anterior lobes were extensively consolidated, very little crepitant lung tissue remaining; the cephalic lobe on the left side and the antero-ventral part of the right caudal lobe showed diffuse patches of consolidation and the rest of the lung was mottled with small angular red patches which surrounded individual nodules. The anterior lobes, and the surfaces of the antero-ventral parts of the caudal lobes were closely studded with slightly raised flattened yellowish-grey nodules which in many places were aggregated together and had coalesced. On section the lung parenchyma was closely beset with caseous tubercles, mainly discrete, the majority varying up to a millet seed in size; here and there were some larger nodules formed apparently by tubercles which had coalesced. The crepitant lung tissue was congested; the trachea was full of frothy fluid.

Thoracic Glands.—The bronchial and mediastinal glands were much enlarged; the cortices of the mediastinal glands were composed of firm grey tissue closely infiltrated with irregular caseous patches of various sizes; the bronchial glands were even more advanced in caseation.

Heart.—There was a pinhead-sized pearly grey tubercle in the endocardium of the right ventricle.

Trachea.—The mucous membrane of the trachea showed two flat caseating growths ulcerated on the surface.

Abdomen.

Omentum and Peritoneum.—On the ventral surface of the omentum there were numerous firm lenticular caseating nodules ranging in greatest diameter up to 8 mm.

There was one small nodule on the floor of the abdomen and one on the peritoneal surface of the diaphragm.

Spleen.—The spleen was enlarged and closely beset with firm yellow caseous nodules ranging from 1 to 3·5 mm. in diameter.

Liver.—The liver substance was closely beset with caseous tubercles from 1· to 1·5 mm. in diameter; there were also some larger nodules scattered about; on the surface some were raised, flattened out, and mushroomed.

Portal Glands.—The portal glands were enlarged, oedematous, and their cortices closely beset with coalescing caseating nodules.

Coeliac Glands.—One resembled the portal glands, the other contained discrete caseous nodules.

Kidneys.—In the cortex of each kidney there were scattered caseous tubercles and nodules ranging from 1 or 1·5 mm. up to about 5 mm.; the majority were small; there were two to three, sometimes more, in each lobule.

Suprarenal Bodies.—In the cortex of the left there were six, and in that of the right three, opaque white caseous miliary tubercles.

Lumbar and Renal Glands.—These glands contained numerous caseating nodules ranging up to 4 mm. in diameter.

Alimentary Tract.

Tongue.—There was a caseous nodule under the mucous membrane at the base of the tongue.

Tonsils.—In each tonsil there were numerous caseating nodules up to a pea in size.

Pharynx.—In the corrugated mucous membrane there was a few caseating nodules.

The Submaxillary, Retropharyngeal, and Parotideal Glands contained moderately numerous caseous nodules up to a hemp-seed in size.

Intestines.—The small intestine showed two caseous nodules 2·5 mm. in diameter in Peyer's patches. The large intestine was normal.

Mesenteric and Ileo-colic Glands.—The mesenteric glands were not enlarged and contained scattered caseating nodules similar to those in the peripheral glands.

The ileo-colic glands contained more numerous tubercles and also some caseating patches.

Eyes.—Normal.

Mamma.—Normal.

Peripheral Lymphatic Glands.

The Precrural, Popliteal, Gluteal, Ischiatic, Pudic, and Axillary Glands contained moderately numerous yellowish-white caseous nodules ranging from a millet to a hemp-seed in size.

Many of the haemo-lymph glands in various parts of the body contained caseous tubercles.

VIRUS H. 128. "D.D." (*b*).

CULTURE INOCULATIONS.

I.—September 2, 1909.

The strain was derived from the human sputum, direct, and had been 85 days in artificial cultivation. The culture used was the 6th generation, 10 days old.

CALF 1587.
Subcutaneous.
Dose : 50·0 mg.
Died : October 18, 1909.
46 days.
P.M. — General tuberculosis.

CALF 1589.
Subcutaneous.
Dose : 50·0 mg.
Killed : October 9, 1909, when dying.
37 days.
P.M. — General tuberculosis.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result
2445	Subcut.	10·0 mg	D. 46 days	G. T.
2446	Subcut.	10·0 mg.	D. 47 ,,	G. T.

II.—August 27, 1909.

The strain was derived from the original material through Guinea-pig 3782 (sternal gland) and had been 59 days in artificial cultivation. The culture used was the 4th generation, 10 days old.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2433	Subcut.	10·0 mg.	D. 74 days	G. T.
2434	Subcut.	10·0 mg.	D. 36 ,,	G. T.

CALF 1587. Virus H. 128. "D.D." (*b*).

Subcutaneous inoculation of culture derived from the original material, direct.

Dose—50·0 milligrammes.

Date of Inoculation—September 2, 1909. [Age about 12 weeks.]

Died—October 18, 1909. [46 days after inoculation.]

Clinical Notes.

The course of the disease was similar to that usually seen in calves suffering from acute tuberculosis following a subcutaneous inoculation.

Temperature.

On the 6th day after inoculation the temperature rose to 40·4° C. ; it reached 41·2° C. on the 9th day From the 10th day onwards until the death of the animal, the temperature was raised and irregular (maximum 40·6° C., minimum 39·0° C.).

Weights.

	cwt.	qrs.	lbs.
September 2, 1909	1	0	4
October 18, 1909	0	3	11

Total loss of weight.—21 lbs

Average rate of loss per week —3·2 lbs.

POST-MORTEM EXAMINATION.

The carcass was emaciated.

Local Lesion.—At the seat of inoculation on the left side of the neck there was a prominent firm swelling measuring 14 by 10 by 6·5 cm. composed of the usual caseo-necrotic substance and infiltrated skin and muscles. The muscles extending from the posterior and inferior margins were for a distance of 8 cm. oedematous and infiltrated with caseating nodules and tubercles. These infiltrated muscles were firmly adherent to the prescapular gland.

Left Prescapular Gland.—The left prescapular gland was much enlarged measuring 11 by 6·5 by 6 cm., and was composed throughout of dense yellow caseous substance ; the capsule was thickened and infiltrated.

Right Prescapular Gland.—The right prescapular gland measured 5 by 2·2 by 1 cm. and contained scattered caseous nodules up to 2·5 mm. in diameter.

Prepectoral Glands.—On the left side one 2 cm. in diameter was dense and caseous throughout ; another, kidney-shaped, 3·7 cm. in length, showed the cortex firm and grey and closely beset with small caseous tubercles ; two others contained a few small caseous tubercles.

Two on the right side contained three caseous nodules varying from a millet to a hemp-seed in size.

Cervical Glands.—On the left side there were three glands which were dense and caseous throughout, one near the angle of the jaw was 3 cm. in diameter, the other two in the middle of the neck were 1 and 2 cm. in greatest diameter; another gland near the angle of the jaw showed half its substance caseous; other cervical glands on this side and all those on the left contained each a few caseous tubercles.

Thorax.

Pleura. — The costal pleura showed along the margins of some of the ribs lines of congested hypertrophied lymphatic fringes in which were numerous caseous tubercles, singly and in clusters. The pleural surface of the diaphragm showed numerous caseous tubercles occurring chiefly in groups and surrounded by congested connective tissue.

Lungs. — The lungs were enlarged and heavy (weight 5 lbs.), they were diffusely mottled with dark red hepatised patches which in the anterior lobes caused consolidation of the greater part of their tissue. The parenchyma of the lungs was closely beset with caseating tubercles ranging up to a milletseed in size and there was a good number of caseous nodules ranging up to a hempseed in size; there were besides many firm yellow caseating masses corresponding to lobules; some were large, one being 3 cm. in greatest diameter, and contained several consolidated lobules.

Thoracic Glands.—The bronchial and dorsal mediastinal glands were moderately enlarged, together weighing 6 ozs.; their cortices were firm and advanced in caseation, the cut surfaces having a yellowish colour; the tuberculous tissue was not however so advanced in caseation as that in the prescapular gland there being still a scanty matrix of grey translucent tissue.

Trachea.—In the mucous membrane there were two ulcerated caseous nodules with deeply congested margins.

Heart.—Normal.

Abdomen.

Omemtum and Peritoneum.—On the ventral surface of the omentum there were scattered caseous nodules ranging up to a split pea in size.

On the peritoneal surface of the diaphragm there were moderately numerous flattened caseating nodules.

Spleen.—The spleen was flabby, its capsule was wrinkled, and the trabeculae were thickened and wiry. The pulp, which appeared to have undergone some atrophy, contained a moderate number of large firm caseating nodules up to 6 mm. in diameter.

Liver.—The substance of the liver showed moderately numerous caseous tubercles and nodules ranging from a mere point up to about 2·5 mm. in diameter, the tubercles were more numerous than the nodules.

On the surface there was a moderate number of flattened caseous nodules with slightly overhanging margins, these ranged up to 4 mm. in diameter.

The falciform ligament was covered with caseating tubercles up to a millet-seed in size.

Portal Glands.—The portal glands showed only a moderate degree of enlargement; their cortices were composed of confluent caseating nodules.

Kidneys.—Each kidney showed in the cortex moderately numerous tubercles up to a millet-seed in size; the majority were grey, the rest had caseous centres; in each kidney there was also a large irregular infiltrating caseous nodule around whose margins were arranged small grey or caseous tubercles.

Suprarenal Bodies.—In each there were two minute greyish-white tubercles.

Alimentary Tract.

Tongue.—Normal.

Pharynx.—The mucous membrane of the soft palate showed one ulcerated caseous nodule.

Tonsils.—In each there were a few firm caseous nodules.

The Parotideal and Right Submaxillary Glands contained scattered caseous nodules up to 5 mm. in diameter.

The Retropharyngeal and the Left Submaxillary Glands contained scattered caseous tubercles.

Intestines.—In the small intestine five Peyer's patches, including the long one, contained scattered caseous tubercles; in the jejunum there was a submucous ulcerated nodule.

In the large intestine there were half-a-dozen submucous caseating nodules.

Mesenteric and Ileo-colic Glands.—The mesenteric glands were not enlarged but their cortices contained caseous nodules and caseating patches of various sizes.

The ileo-colic glands were similar but more of the cortex in each case was affected.

Eyes.—Normal.

Testicles.—Normal.

Various Lymphatic Glands.

The Precrural, Popliteal, and Pudic Glands contained discrete caseous nodules, the majority large, up to 5 mm. in diameter.

The Left Gluteal Gland contained a large caseous nodule; the right a few caseous tubercles.

The Left Ischiatic Gland was caseo-purulent; the right contained a hempseed-sized caseous nodule.

The Iliac Glands contained scattered caseous tubercles up to 1·5 mm. in diameter.

The Coeliac Glands were enlarged; their cortices were grey and infiltrated with caseous patches and foci.

The Lumbar and Renal Glands were slightly enlarged and contained caseating nodules and patches.

CALF 1589. Virus H. 128. "D.D." (*b*).

Subcutaneous inoculation of culture derived from the original material direct.

Dose—50·0 milligrammes.

Date of Inoculation—September 2, 1909. [Age about 12 weeks.]

Killed when dying—October 9, 1909. [37 days after inoculation.]

Clinical Notes.

The course of the disease was similar to that usually seen in calves suffering from acute tuberculosis.

Temperature.

The temperature rose on the 5th day after inoculation to 39·9° C.; and continued to rise gradually until the 29th day, when 41·0° C. was recorded. In the course of the next seven days the temperature fell to 39·9° C., and on the following day 38·0° C.; the calf was in a dying condition and was therefore killed.

Weights.

	cwt.	qrs.	lbs.
September 2, 1909	1	0	10
October 9, 1909	0	3	18

Total loss of weight—20 lbs.

Average rate of loss per week.—3·9 lbs.

POST-MORTEM EXAMINATION.

The carcass was emaciated.

Local Lesion.—On the left side of the neck there was a firm tumour measuring 13 by 10 by 3·5 cm. with skin and infiltrated muscles; on section it was composed of a lenticular caseo-necrotic mass, thickened and infiltrated skin, and infiltrated muscles.

Left Prescapular Gland.—The left prescapular gland measured 11·5 by 5·8 by 4 cm. and was dense and caseous throughout.

Right Prescapular Gland.—The right prescapular gland measured 4·5 by 2 by 1 cm. and resembled the precrural and other peripheral glands.

Prepectoral Glands.—On the left side one was 3 cm. in greatest diameter and was composed throughout of dense pinkish-yellow caseo-necrotic substance. Another showed caseating patches and discrete tubercles.

Those on the right side resembled the peripheral lymphatic glands.

Cervical Glands—One near the lesion was grey and beset with minute foci; the upper and lower on each side contained numerous caseous tubercles; the others, all small ones, also contained numerous caseous tubercles.

Thorax.

Pleura.—The costal pleura showed patches of early tuberculosis along the ribs, and on the diaphragmatic pleura there were a few caseating nodules and patches of granulation tissue.

Lungs.—The lungs were crepitant and mottled with small irregular red patches; here and there was a consolidated lobule but there were no large areas of consolidation; the lung parenchyma was moderately closely beset with miliary caseating tubercles, here and there aggregated together into small groups.

Thoracic Glands.—The bronchial and dorsal mediastinal glands were moderately enlarged; their cortices were composed of firm grey tissue beset with irregular caseous tubercles; the medullae were deeply congested.

Heart.—Under the pericardium there was a small flat caseating tubercle. On the endocardium of the right auricle and ventricle were scattered minute grey tubercles.

Trachea.—There were numerous early tubercles on the mucous membrane of the trachea.

Abdomen.

Omentum and Peritoneum.—The ventral surface of the omentum showed numerous caseating nodules and tubercles ranging up to 4 mm. in diameter; they were loosely attached, flattened, and some were deeply haemorrhagic.

The parietal peritoneum was normal.

Spleen.—The spleen was enormously enlarged; it measured 41 by 13·5 by 5 cm. and weighed 2 lbs. 3½ ozs.; the pulp was very firm and packed almost as closely as possible with firm yellow caseous nodules with reddish margins the majority about 2 mm. in diameter; throughout the organ they were associated together in little groups and many had become confluent.

Liver.—The liver was enlarged and the substance pale; it was closely beset with yellow caseous tubercles measuring 0·5 to 1·5 mm. in diameter; the substance of the liver between the caseous tubercles was closely peppered with minute grey tubercles just visible to the naked eye.

Portal Glands.—The portal glands were enlarged and oedematous and their cortices were composed of firm caseating tuberculous patches.

Coeliac Glands.—All were enlarged, one showed the cortex composed nearly throughout of firm caseating patches, the others were beset with more or less discrete caseous tubercles.

Kidneys.—In the cortex of each kidney were scattered caseous tubercles with grey margins ranging from 1 to 2 mm. in diameter.

Suprarenal Bodies.—In the cortex of the left there was one tubercle and in that of the right three.

Alimentary Tract.

Tongue.—Normal.

Pharynx.—The mucous membrane of the pharynx and soft palate was closely beset with caseous tubercles.

Tonsils.—Each contained a number of caseous tubercles.

The Retro-pharyngeal, Submaxillary, and Parotideal Glands showed in the cortices numerous yellow caseous tubercles irregular in outline ranging in diameter up to about 1·5 mm.

Intestines.—All the Peyer's patches in the small intestine contained numerous caseous tubercles and there were moderately numerous submucous tubercles.

The large intestine showed numerous submucous caseous tubercles.

The Mesenteric and Ileo-colic Glands showed numerous caseous tubercles in the cortices.

Various Lymphatic Glands.

The Precrural, Popliteal, Iliac, Lumbar, and Pudic Glands showed in the cortices numerous yellow caseous tubercles irregular in outline ranging in diameter up to about 1·5 mm.

The Renal Glands contained similar but rather more numerous tubercles.

Haemolymph Glands.—All contained caseous tubercles.

Testes.—Normal.

VIRUS H. 129. "T.M."

SPUTUM.

CULTURE INOCULATIONS.

I.—April 2, 1909.

The strain was derived from the original material through Guinea-pig 3479 (sternal gland) and had been 33 days in artificial cultivation. The culture used was the 3rd generation, 10 days old.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
3661	Intrap.	0·1 mg.	D. 20 days	G. T.
3662	Subcut.	0·1 mg.	D. 39 „	G. T.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2255	Intrav.	0·1 mg.	D. 106 days	G. T.
2254	Intrav.	0·01 mg.	K. 119 „	G. T.
2257	Subcut.	12·0 mg.	K. 119 „	Local T., severe T. of lungs and slight T. of kidneys.
2256	Subcut.	10·0 mg.	K. 119 „	Local T., T. of lungs and kidneys.

CULTURE

Derived from the lung of Rabbit 2256. The 3rd generation of culture was used, when 14 days old, on September 13, 1909.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2453	Subcut.	10·0 mg.	K. 109 days	Local lesion and very slight T. of lungs.
2454	Subcut.	10·0 mg.	K. 109 „	

CULTURE

Derived from the lung of Rabbit 2257. The 3rd generation of culture was used for inoculation on September 13, 1909, when 14 days old.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2455	Subcut.	10·0 mg.	K. 110 days	Local T. and slight T. of lungs.
2456	Subcut.	10·0 mg.	K. 110 „	Local T. and slight T. of lungs and kidneys.

II.—September 1, 1909.

The strain was derived from the original material through Guinea-pig 3479 and had been 185 days in artificial cultivation. The culture used was the 11th generation, 6 days old.

CALF 1597.

Subcutaneous.
Dose : 45·0 mg.
Killed : December 2, 1909.
92 days.
P.M.—Local T. and a few disseminated lesions.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2437	Subcut.	10·0 mg.	K. 149 days	Local T. and slight T. of lungs.
2438	Subcut.	10·0 mg.	K. 149 „	Local lesion and slight T. of lungs.

CALF 1597. Virus H. 129. "T.M."

Subcutaneous inoculation of culture derived from the original material through Guinea-pig 3479.

Dose—45·0 milligrammes.

Date of Inoculation—September 1, 1909. [Age 11 weeks.]

Killed when in good health—December 2, 1909. [92 days after inoculation.]

Clinical Notes.

The calf remained well during the experiment and creased normally in size and weight.

Temperature.

There was a period of irregular pyrexia commencing on the 9th day after inoculation and lasting 18 days (maximum 39·9° C., minimum 38·5° C.). Subsequently the temperature though irregular showed no marked deviation from the normal.

Tuberculin Test.

October 29, 1909. [58 days after inoculation.] Dose 2·0 cc. Reacted. Rise of temperature 1·4° C.

Weights.

	cwt.	qrs.	lbs.
September 1, 1909	1	0	3
December 2, 1909	1	3	6

Total gain of weight.—3 qrs. 3 lbs.

Average rate of gain per week.—6·7 lbs.

POST-MORTEM EXAMINATION.

The carcass was fat.

Local Lesion.—The lesion at the seat of inoculation on the left side of the neck consisted of thickened skin containing a depressed scar and a subcutaneous patch of fibroid tissue showing a few caseous gritty nodules.

Left Prescapular Gland.—The left prescapular gland measured 5·5 by 3 by 1·7 cm. and showed in the cortex tuberculous masses replacing nearly half the substance, composed of caseous and softened gritty nodules embedded in translucent fibroid tissue.

Right Prescapular Gland.—The right prescapular gland measured 4·7 by 2 by 1 cm. and was normal on section.

Prepectoral Glands.—Normal.

Cervical Glands.—One on the left side contained a calcareo-caseous tubercle the size of a millet seed; the rest were normal.

Thorax.

Lungs. — Under the pleura two minute grey tubercles with calcareous centres were seen; none was seen on section.

Abdomen.

Mesenteric and Ileo-colic Glands.—In the cortex of each mesenteric gland were yellow caseo-calcareous foci, numerous in the posterior glands, scattered in the rest. The ileo-colic glands contained similar foci in places aggregated together into groups.

The remaining organs and glands were examined and found normal.

Microscopical Examination.

Smear from foci from Mesenteric Glands. — One beaded tubercle bacillus seen.

VIRUS H. 130. "N.B."
SPUTUM.

CULTURE INOCULATIONS.

March 30, 1909.

The strain was derived from the original material through Guinea-pig 3481 (manubrial gland) and had been 29 days in artificial cultivation.

The culture used was the 3rd generation, 9 days old.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
3649	Intrap.	0·1 mg.	D. 17 days	G. T.
3650	Subcut.	0·1 mg.	D. 91 „	G. T.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2234	Intrav.	0·1 mg.	D. 23 days	Early G. T. (?) cause of death.
2235	Intrav.	0·01 mg.	D. 59 „	Slight T. of lungs and kidneys; death from other causes.
2236	Subcut.	22·0 mg.	K. 113 „	Local lesion and slight T. of lungs.
2237	Subcut.	10·0 mg.	K. 113 „	Local lesion and T. of lungs and kidneys (slight) and T. of one testicle.

VIRUS H. 131. "M.H."

SPUTUM.

CULTURE INOCULATIONS.

MARCH 30, 1909.

The strain was derived from the original material through Guinea-pig 3483 (sternal gland) and had been 29 days in artificial cultivation.

The culture used was the 3rd generation, 10 days old.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
3651	Intrap.	0·1 mg.	D. 35 days	G. T.
3652	Subcut.	0·1 mg.	D. 61 „	G. T.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2238	Intrav.	0·1 mg.	D. 41 days	T. of lungs. Death from pseudo-tuberculosis.
2239	Intrav.	0·01 mg.	D. 78 „	Slight generalised T. (?) cause of death.
2240	Subcut.	17·0 mg.	K. 114 „	Local lesion only.
2241	Subcut.	10·0 mg.	D. 54 „	Local lesion and slight T. of lungs and one kidney.

VIRUS H. 132. "O.O."

SPUTUM.

CULTURE INOCULATIONS.

MARCH 30, 1909.

The strain was derived from the original material through Guinea-pig 3485 (manubrial gland) and had been 29 days in artificial cultivation. The culture used was the 3rd generation, 10 days old.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
3653	Intrap.	0·1 mg.	D. 22 days	G. T.
3654	Subcut.	0·1 mg.	D. 52 „	G. T.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2242	Intrav.	0·1 mg.	D. 117 days	Chronic G. T.
2243	Intrav.	0·01 mg.	K. 119 „	Chronic G. T.
2244	Subcut.	18·0 mg.	K. 119 „	Local lesion, slight miliary T. of lungs, and T. of mamma.
2245	Subcut.	10·0 mg.	K. 119 „	Local lesion only.

VIRUS H. 133. "P.K."

SPUTUM.

CULTURE INOCULATIONS.

I.—April 28, 1909.

The strain was derived from the original material through Guinea-pig 3449 (manubrial gland) and had been 27 days in artificial cultivation. The culture used was the 3rd generation, 5 days old.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
3738	Intrap.	0·1 mg.	D. 27 days	G. T.
3739	Subcut.	0·1 mg.	D. 36 „	G. T.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2329	Intrav.	0·1 mg.	K. 106 days	Slight T. of lungs and kidneys.
2328	Intrav.	0·1 mg.	K. 106 „	Slight T. of lungs, kidneys, right eye, and lachrymal glands.
2327	Intrav.	0·01 mg.	K. 106 „	Slight T. of lungs and kidneys.
2331	Subcut.	17·0 mg.	K. 106 „	Local T. only.
2330	Subcut.	10·0 mg.	K. 106 „	Local T. and slight T. of lungs and kidneys.

VIRUS H. 133. "P.K."

CULTURE INOCULATIONS—*continued.*

II.—May 29, 1909.

The strain was derived from the original material through Guinea-pig 3449, and had been 58 days in artificial cultivation. The culture used was the 7th generation, 8 days old.

CALF 1581.

Subcutaneous.

Dose : 50·0 mg.

Killed September 7, 1909.
101 days.

P.M.—Thin-walled cyst at seat of inoculation with caseo-purulent and watery contents. The left prescapular gland contained three fibroid nodules, one with a caseous centre. Five calcareous foci were seen in the mesenteric glands.

CALF 1575.

Subcutaneous.

Dose : 50·0 mg.

Killed September 7, 1909.
101 days.

P.M.—The local tumour was a cyst with thick fibrous walls and caseo-purulent contents. The left prescapular and one prepectoral gland were enlarged and extensively caseous or calcareous. Another prepectoral gland contained a few calcareous foci. One ileo-colic gland showed a single calcareous tubercle.

RHESUS MONKEY 329.

Subcutaneous.

Dose : 1·0 mg.

Died June 23, 1909.
25 days.

P.M.—General tuberculosis.

RHESUS MONKEY 331.

Subcutaneous.

Dose : 1·0 mg.

Died June 28, 1909.
30 days.

P.M.—Slight general tuberculosis insufficient to account for death.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2360	Intrav.	1·0 mg.	D. 69 days	T. of lungs, portal gland and kidneys.
2358	Intrav.	0·1 mg.	K. 103 „	Slight T. of lungs and kidneys.
2359	Intrav.	0·1 mg.	D. 20 „	Early G. T.
2361	Subcut.	10·0 mg.	K. 103 „	Local lesion, slight T. of lungs, one tubercle in a kidney.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
3765	Intrap.	0·1 mg.	D. 13 days	G. T.
3766	Subcut	0·1 mg.	D. 40 „	G. T. (not severe).

CALF 1575. Virus H. 133. "P.K."

Subcutaneous inoculation of culture derived from the original material through Guinea-pig 3449.

Dose—50·0 milligrammes.

Date of Inoculation—May 29, 1909. [Age about 12 weeks.]

Killed when in good health—September 7, 1909. [101 days after inoculation.]

Clinical Notes.

The calf remained well and grew normally during the experiment.

Temperature.

On the 9th day after inoculation the temperature rose to 39·9° C.; it remained at this level for four days, and then gradually fell to the normal; the pyrexia lasted fifteen days.

Subsequently the temperature was normal.

Tuberculin Test.

August 16, 1909. [79 days after inoculation.] Dose, 2·0 cc. Reacted. Rise of temperature, 2·5° C.

Weights.

	cwt.	lbs.
May 29, 1909	1	2
September 7, 1909	2	3

Total gain of weight.—1 cwt. 1 lb.

Average rate of gain per week.—7·8 lbs.

POST-MORTEM EXAMINATION.

The carcass was fat.

Local Lesion.—At the seat of inoculation on the left side of the neck there was a circumscribed semi-fluctuating swelling measuring 11 by 6·5 by 4 cm.; on section it was a cyst containing firm caseous masses and caseo-pus; the walls were thick and fibrous; the skin showed a funnel-shaped opening which communicated with the interior of the cyst.

Left Prescapular Gland.—The left prescapular gland measured 6·5 by 3·5 by 2 cm. and showed about half its substance replaced by dense caseous masses or fibro-calcareous patches.

Right Prescapular Gland.—The right prescapular gland measured 4·3 by 2·3 by 1 cm. and was normal on section.

Prepectoral Glands.—On the left side one the size of a cherry was three-quarters dense and caseous, the rest of the substance being fibrous. Another contained a small group of calcareous foci.

The glands on the right side were normal.

Ileo-colic Glands.—One contained a pinhead-sized calcareous tubercle.

All the organs and the lymphatic glands other than those mentioned above were free from tuberculous lesions.

CALF 1581. Virus H. 133. "P.K."

Subcutaneous inoculation of culture derived from the original material through Guinea-pig 3449.

Dose—50·0 milligrammes.

Date of Inoculation—May 29, 1909. [Age about 12 weeks.]

Killed when in good health—September 7, 1909. [101 days after inoculation.]

Clinical Notes.

The calf remained well and grew normally during the experiment.

Temperature.

On the 9th day after inoculation the temperature rose; it reached a maximum (40·9° C.) on the 11th day, and then gradually returned to the normal (the pyrexial period lasted 23 days). From the 31st day onwards the temperature was normal.

Tuberculin Test.

August 16, 1909. [79 days after inoculation.] Dose, 2·0 cc. Reacted. Rise of temperature, 1·2° C.

Weights.

	cwt.	lbs.
May 29, 1909	1	17
September 7, 1909	2	17

Total gain of weight.—1 cwt.

Average rate of gain per week.—7·7 lbs.

POST-MORTEM EXAMINATION.

The carcass was fat.

Local Lesion.—At the seat of inoculation, on the left side of the neck, there was a fluctuating swelling the size of a Jaffa orange; on section it was a thin-walled cyst filled with turbid watery fluid and softened caseous masses.

Left Prescapular Gland.—The left prescapular gland measured 5·3 by 2·5 by 1·4 cm. and contained three brownish fibroid nodules, the largest the size of a pea, with a caseous and softened centre.

Right Prescapular Gland.—The right prescapular gland measured 5·3 by 2·2 by 1 cm. and was normal on section.

Mesenteric Glands.—In these glands five calcareous foci were found.

There was no sign of tuberculosis in the organs or in the remaining lymphatic glands.

RHESUS MONKEY 329. Virus H. 133. "P K."

(A young animal.)

Subcutaneous inoculation of culture derived from the original material through Guinea-pig 3449.

Dose—1·0 milligramme.

Date of Inoculation—May 29, 1909.

Died—June 23, 1909. [25 days after inoculation.]

POST-MORTEM EXAMINATION.

The carcass was thin. Its weight was 1,200 grammes.

Local Lesion.—In the subcutaneous tissues just behind the right scapula there was a flat space, 3 cm. in greatest diameter, containing curdy caseopus; it was lined with granulation tissue and the skin over it showed a small opening discharging pus.

Axillary Glands.—On the right side there was a group of six enlarged caseous and softened glands, the largest 1 cm. in diameter; on the left side one contained three caseous tubercles; the rest were normal.

Vertebral Glands.—On the right side, in the 6th to the 9th interspaces, there was a chain of enlarged caseous and softened glands, the largest the size of a split pea; the rest were normal.

Cervical Glands.—In the right posterior triangle there were five caseous and softened glands, the largest the size of a pea.

Thorax.

Lungs.—The lungs were crepitant and collapsed normally; under the pleura of one of the lobes there were two miliary tubercles, one grey the other caseous; no tubercles were seen elsewhere on the surfaces of the lungs and no tubercles were found on section.

Bronchial Glands.—The bronchial glands were normal in size; in each there were two or three caseous tubercles.

Heart and Pleura.—Normal.

Abdomen.

Omentum and Peritoneum.—The omentum contained a moderate number of minute grey tubercles. The peritoneum was normal.

Spleen.—The spleen was enlarged, measuring 5·5 by 2·5 by 1·5 cm. and contained moderately numerous caseous miliary tubercles.

The splenic lymphatic glands were slightly enlarged and each contained a minute caseous tubercle or two.

Liver.—The liver was closely beset with caseous tubercles ranging in size from a mere speck up to a millimetre in diameter.

The gland on the head of the pancreas was slightly enlarged and showed in the cortex numerous discrete caseous tubercles.

A gland on the cardiac end of the stomach contained two or three caseous foci.

Kidneys.—There were two minute caseous tubercles in the cortex of the left kidney and three in that of the right.

The Iliac and Inguinal Glands each contained a few caseous tubercles.

The Mesenteric Glands contained a few caseous foci.

The other organs and glands of the body were examined and found normal.

RHESUS MONKEY 331. Virus H. 133. "P.K."

(A young animal.)

Subcutaneous inoculation of culture derived from the original material through Guinea-pig 3449.

Dose—1·0 milligramme.

Date of Inoculation—May 29, 1909.

Died—June 28, 1909. [30 days after inoculation.]

POST-MORTEM EXAMINATION.

The carcass was in good condition; there was a moderate amount of subcutaneous and abdominal fat. Its weight was 1,840 grammes.

Local Lesion.—In the subcutaneous tissues of the right scapula there was a collapsed caseous abscess, the skin over which showed an irregular ulcer 1·5 cm. in diameter; the posterior wall of the cavity was formed by fibroid muscular tissue containing caseous tubercles.

Axillary Glands.—On the right side there were four enlarged glands the largest 1·5 cm. in diameter all of which were caseous and softened practically throughout; the glands on the left side were normal.

Cervical Glands.—On the right side one in the posterior triangle the size of a large pea was caseous and softened throughout; those on the left side were normal.

Vertebral Glands.—On the right side in the 6th to the 8th interspaces there were three caseous and softened glands the largest 8 mm. in diameter.

Thorax.

Lungs.—The lungs were congested but crepitant throughout; they showed just beneath the pleura altogether about a dozen caseous tubercles with grey margins the largest the size of a millet seed; two or three similar tubercles were seen on section.

Bronchial Glands.—One interbronchial gland contained two caseous tubercles, the rest were normal.

Abdomen.

Spleen.—The spleen was normal in size and showed on section moderately numerous caseous and softened nodules varying from 1 up to nearly 3 mm. in diameter.

Liver.—The liver was normal in general appearance and showed under the capsule sparsely scattered caseous tubercles with grey margins varying in size up to that of a millet seed; similar tubercles were sparsely scattered throughout the substance.

The gland on the head of the pancreas was normal in size and showed throughout the cortex a moderate number of discrete caseous and softened tubercles up to a millet seed in size.

Kidneys.—The right kidney showed in the cortex near the surface two grey miliary tubercles with caseous centres; the left was normal.

Lumbar Glands.—One contained a small caseous nodule, another three or four miliary tubercles.

Pharyngeal Glands.—The left pharyngeal gland was slightly enlarged and contained a caseous and softened patch about 2 mm. in diameter.

There was no sign of tuberculosis in any other organ or gland.

The skin at the root of the tail was thickened and ulcerated.

In the pelvis on each side of the rectum there were several much enlarged glands none of which showed any sign of caseation.

VIRUS H. 134. "K.K."

SPUTUM.

CULTURE INOCULATIONS.

MARCH 29, 1909.

The strain was derived from the original material through Guinea-pig 3489 (manubrial gland) and had been 32 days in artificial cultivation. The culture used was the 3rd generation, 6 days old.

GUINEA-PIGS.

Number	Method.	Dose.	Duration of Life.	Result.
3645	Intrap.	0·1 mg.	D. 30 days	G. T.
3646	Subcut.	0·1 mg.	D. 44 „	G. T.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2226	Intrav.	0·1 mg.	D. 57 days	Slight G. T., insufficient to account for death.
2227	Intrav.	0·01 mg.	D. 34 „	T. of lungs only. Death from cellulitis.
2228	Subcut.	50·0 mg.	K. 105 „	Local lesion, slight T. of lungs and kidneys.
2229	Subcut.	10·0 mg.	K. 105 „	Slight G. T.

VIRUS H. 135. "E.E."

SPUTUM.

CULTURE INOCULATIONS.

I.—MARCH 29, 1909.

The strain was derived from the original material through Guinea-pig 3491 (sternal gland) and had been 28 days in artificial cultivation. The culture used was the 3rd generation, 9 days old.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
3647	Intrap.	0·1 mg.	D. 21 days	G. T.
3648	Subcut.	0·1 mg.	D. 51 „	G. T.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2230	Intrav.	0·1 mg.	K. 113 days	Chronic G. T.
2231	Intrav.	0·01 mg.	K. 113 „	One tubercle in a kidney only.
2232	Subcut.	16·0 mg.	D. 12 „	Death from pneumonia.
2233	Subcut.	10·0 mg.	D. 12 „	Cause of death not apparent.

VIRUS H. 135. "E.E."—*continued.*

CULTURE INOCULATIONS—*continued.*

II.—April 29, 1909.

The same strain was used, after 59 days artificial cultivation. The culture used was the 6th generation, 16 days old.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2337	Subcut.	44·0 mg.	D. 13 days	Death from injuries.
2336	Subcut.	10·0 mg.	K. 106 ,,	Local lesion only.

VIRUS H. 136. "X.B."

SPUTUM.

CULTURE INOCULATIONS.

April 14, 1909.

The strain was derived from the original material through Guinea-pig 3522 (manubrial gland) and had been 36 days in artificial cultivation. The culture used was the 4th generation, 8 days old.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
3709	Intrap.	0·1 mg.	D. 21 days	G. T.
3710	Subcut.	0·1 mg.	D. 51 ,,	G. T.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2296	Intrav.	0·1 mg.	D. 16 days	T. of lungs only.
2295	Intrav.	0·01 mg.	D. 50 ,,	Slight generalised T.
2299	Subcut.	100·0 mg.	K. 119 ,,	Local T., and slight T. of lungs and kidneys.
2297	Subcut.	10·0 mg.	D. 42 ,,	Local lesion, slight T. of lungs and kidneys. Death from infarction of lungs.
2298	Subcut.	10·0 mg.	D. 36 ,,	Local T. and slight T. of lungs. ? cause of death.

VIRUS H. 137. "O.B."

SPUTUM.

CULTURE INOCULATIONS.

April 5, 1909.

The strain was derived from the original material through Guinea-pig 3524 (sternal gland) and had been 27 days in artificial cultivation. The culture used was the 3rd generation, 6 days old.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
3673	Intrap.	0·1 mg.	D. 28 days	G. T.
3674	Subcut.	0·1 mg.	D. 50 "	G. T.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2275	Intrav.	0·1 mg.	K. 126 days	Slight T. of kidneys only.
2274	Intrav.	0·01 mg.	K. 126 "	Slight T. of lungs only.
2277	Subcut.	20·0 mg.	D. 35 "	Slight disseminated T.
2276	Subcut.	10·0 mg.	K. 126 "	Local lesion only.

VIRUS H. 138. "C.C."

SPUTUM.

CULTURE INOCULATIONS.

April 3, 1909.

The strain was derived from the original material through Guinea-pig 3526 (sternal gland) and had been 25 days in artificial cultivation. The culture used was the 3rd generation, 7 days old.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
3665	Intrav.	0·1 mg.	D. 19 days	Early G. T. not severe.
3666	Subcut.	0·1 mg.	D. 42 "	G. T.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2259	Intrav.	0·1 mg.	K. 124 days	Slight T. of lungs, spleen and kidneys.
2258	Intrav.	0·01 mg.	K. 124 "	Slight T. of lungs and kidneys.
2261	Subcut.	35·0 mg.	K. 124 "	Local lesion and very slight T. of lungs and a kidney.
2260	Subcut.	10·0 mg.	K. 124 "	Local lesion and slight T. of lungs.

VIRUS H. 139. "K.H."

SPUTUM.

CULTURE INOCULATIONS.

April 3, 1909.

The strain was derived from the original material through Guinea-pig 3529 (sternal gland) and had been 25 days in artificial cultivation. The culture used was the 3rd generation, 7 days old.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
3667	Intrap.	0·1 mg.	D. 16 days	Early G. T. insufficient to account for death.
3668	Subcut.	0·1 mg.	D. 44 "	G. T.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2263	Intrav.	0·1 mg.	D. 16 days	Early G. T. Death from rupture of spleen.
2262	Intrav.	0·01 mg.	K. 124 "	Slight T. of lungs and kidneys.
2265	Subcut.	20·0 mg.	K. 124 "	Local lesion, slight T. of lungs and kidneys.
2264	Subcut.	10·0 mg.	K. 124 "	Local lesion, slight T. of lungs and kidneys.

VIRUS H. 140. "J.J."

SPUTUM.

CULTURE INOCULATIONS.

I.—April 23, 1909.

The strain was derived from the original material through Guinea-pig 3607 (manubrial gland), and had been 28 days in artificial cultivation. The culture used was the 3rd generation, 10 days old.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
3732	Intrap.	0·1 mg.	D. 26 days	G. T.
3733	Subcut.	0·1 mg.	D. 51 "	G. T.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2317	Intrav.	0·1 mg.	D. 22 days	G. T.
2316	Intrav.	0·01 mg.	K. 110 "	Slight T. of lungs and a kidney.
2319	Subcut.	100·0 mg.	K. 110 "	Local lesion and slight T. of lungs and kidneys.
2318	Subcut.	10·0 mg.	K. 110 "	Local T. and slight T. of lungs and a kidney.

VIRUS H. 140. "J.J."—*continued.*

CULTURE INOCULATIONS—*continued.*

II.—JUNE 23, 1909.

The strain was derived from the original material through Guinea-pig 3607, and had been 89 days in artificial cultivation. The culture used was the 8th generation, 6 days old.

MICE.

Number.	Method.	Dose.	Duration of Life.	Result.
35	Intrap.	10·0 mg.	D. 26 days	Acute T.
36	Intrap.	10·0 mg.	D. 8 ,,	Acute T.
37	Subcut.	10·0 mg.	D. 37 ,,	Death from pneumonia. No sign of T. T.B. seen in smear from lung.

KITTENS.

Number.	Method.	Dose.	Duration of Life.	Result.
61	Intrap.	1·0 mg.	K. 162 days	Minute tubercles in omentum only.
63	Intrap.	1·0 mg.	K. 162 ,,	
65	Subcut.	1·0 mg.	K. 162 ,,	Local tuberculosis only.
67	Subcut.	1·0 mg.	K. 162 ,,	

KITTENS 61, 63, 65, and 67. Virus H. 140. "J.J."

Inoculated with culture derived from the human sputum through Guinea-pig 3607.

Date of Inoculations—June 23, 1909.

Kitten 61. *Intraperitoneal.*

Dose—1·0 milligramme.

Killed—December 2, 1909. [162 days after inoculation.]

Weights—June 23, 1909. 800 grammes.
December 2, 1909. 1,950 grammes.

POST-MORTEM EXAMINATION.

In the omentum there was a moderate number of minute almost transparent tubercles which were apparently attached to minute lymphatic twigs.

There was no sign of tuberculosis elsewhere.

Kitten 63. *Intraperitoneal.*

Dose—1·0 milligramme.

Killed—December 2, 1909. [162 days after inoculation.]

Weights—June 23, 1909. 800 grammes.
December 2, 1909. 1,800 grammes.

POST-MORTEM EXAMINATION.

In the omentum there was a moderate number of minute almost transparent tubercles which were apparently attached to minute lymphatic twigs.

There was no sign of tuberculosis elsewhere.

Kitten 65. *Subcutaneous.*

Dose—1·0 milligramme.

Killed—December 2, 1909. [162 days after inoculation.]

Weights—June 23, 1909. 800 grammes.
December 2, 1909. 2,350 grammes.

POST-MORTEM EXAMINATION.

In the subcutaneous tissues of the abdominal wall at the seat of inoculation there was a small cavity lined with granulation tissue containing gritty caseo-pus.

There was no sign of tuberculosis elsewhere.

Kitten 67. *Subcutaneous.*

Dose—1·0 milligramme.

Killed—December 2, 1909. [162 days after inoculation.]

Weights—June 23, 1909. 800 grammes.
December 2, 1909. 2,070 grammes.

POST-MORTEM EXAMINATION.

In the subcutaneous tissues of the abdominal wall at the seat of inoculation there was a fibro-caseo-calcareous mass, irregular in outline and measuring 3 by 1 by 0·5 cm.

There was no sign of disease elsewhere.

VIRUS H. 141. "C.H."

SPUTUM.

CULTURE INOCULATIONS.

APRIL 5, 1909.

The strain was derived from the original material through Guinea-pig 3532 (manubrial gland), and had been 27 days in artificial cultivation. The culture used was the 3rd generation, 9 days old.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
3675	Intrap.	0·1 mg.	D. 30 days	G. T.
3676	Subcut.	0·1 mg.	D. 57 ,,	G. T.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2279	Intrav.	0·1 mg.	K. 127 days	Slight T. of lungs and kidneys.
2278	Intrav.	0·01 mg.	D. 45 ,,	Scattered miliary tubercles in lungs and kidneys. ? cause of death.
2281	Subcut.	30·0 mg.	K. 127 ,,	Local lesion and slight T. of lungs and kidneys.
2280	Subcut.	10·0 mg.	K. 127 ,,	Local lesion and slight T. of lungs.

VIRUS H. 142. "Q.H."

SPUTUM.

CULTURE INOCULATIONS.

APRIL 3, 1909.

The strain was derived from the original material through Guinea-pig 3534 (sternal gland), and had been 28 days in artificial cultivation. The culture used was the 3rd generation, 11 days old.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
3669	Intrap.	0·1 mg.	D. 19 days	Early G. T. not severe.
3670	Subcut.	0·1 mg.	D. 47 ,,	G. T.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2267	Intrav.	0·1 mg.	K. 125 days	T. of lungs, kidneys, and a lachrymal gland.
2266	Intrav.	0·01 mg.	K. 125 ,,	T. of lungs, kidneys, one eye, and a lachrymal gland.
2269	Subcut.	10·0 mg.	K. 125 ,,	Local lesion and slight T. of lungs.
2268	Subcut.	5·0 mg.	K. 125 ,,	Local lesion and slight T. of lungs.

VIRUS H. 143. "L.L."
SPUTUM.

CULTURE INOCULATIONS.

I.—April 6, 1909.

The strain was derived from the original material through Guinea-pig 3536 (sternal gland) and had been 28 days in artificial cultivation.

The culture used was the 3rd generation, 7 days old.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
3681	Intrap.	0·1 mg.	D. 27 days	G. T.
3682	Subcut.	0·1 mg.	D. 47 ,,	G. T.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2283	Intrav.	0·1 mg.	D. 37 days	Slight T. of lungs and kidneys. Death from cellulitis.
2282	Intrav.	0·01 mg.	K. 126 ,,	Slight G. T. progressive on pleura (probably spontaneous).
2285	Subcut.	10·0 mg.	D. 89 ,,	G. T. (local lesion secondarily infected).
2284	Subcut.	6·0 mg.	D. 8 ,,	(?) cause of death.

CULTURES

Derived from Rabbit 2282 (kidney nodule and pleural growth). Inoculated on November 30, 1909, after 112 days artificial cultivation. Both cultures were of the 6th generation, 11 days old.

RABBITS.

—	Number.	Method.	Dose.	Duration of Life.	Result.
Kidney nodule	2471	Intrav.	0·01 mg.	D. 28 days	General miliary T.
	2472	Intrav.	0·01 mg.	D. 29 ,,	General miliary T.
	2473	Intrav.	0·01 mg.	D. 30 ,,	General miliary T.
Pleural growth	2474	Intrav.	0·01 mg.	D. 30 ,,	General miliary T.
	2475	Intrav.	0·01 mg.	D. 33 ,,	G. T.
	2476	Intrav.	0·01 mg.	D. 28 ,,	General miliary T.

CULTURE

Derived from the lung of Rabbit 2285.

The 3rd generation, 14 days old, was used for inoculation on August 20, 1909.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2413	Intrav.	0·01 mg.	K. 118 days	Slight T. of lungs and kidneys.
2414	Intrav.	0·01 mg.	K. 118 ,,	
2415	Subcut.	10·0 mg.	K. 118 ,,	Local lesion; T. of lungs and kidneys (slight).

II.—July 28, 1909.

The strain was derived from the original material through Guinea-pig 3536 and had been 141 days in artificial cultivation.

The culture used was the 10th generation, 21 days old.

KITTENS.

Number.	Method.	Dose.	Duration of Life.	Result.
69	Intrap.	10·0 mg.	K. 146 days	No T.
71	Intrap.	10·0 mg.	K. 146 ,,	No T.

MICE.

Number.	Method.	Dose.	Duration of Life.	Result.
39	Intrap.	1·0 mg.	D. 103 days	Acute T.
40	Subcut.	10·0 mg.	D. 103 ,,	No T. (T. B. in inguinal gland and lung.)

VIRUS H. 143. "L.L."—*continued.*

CULTURE INOCULATIONS—*continued.*

III.—September 1, 1909.

The strain was derived from the original material through Guinea-pig 3536, and had been 176 days in artificial cultivation.

The culture used was the 14th generation, 6 days old.

CALF 1601.

Subcutaneous.
Dose : 68·0 mg.
Killed : December 1, 1909.
91 days.
P.M. Local T. and a few disseminated lesions.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2439	Subcut.	10·0 mg.	K. 149 days	Local T.: slight T. of lungs and kidneys.
2440	Subcut.	10·0 mg.	K. 149 „	Local lesion: moderately severe T. of lungs and slight T. of kidneys.

CALF 1601. Virus H. 143. "L.L."

Subcutaneous inoculation of culture derived from the original material through Guinea-pig 3536.

Dose—68·0 milligrammes.

Date of Inoculation—September 1, 1909. [Age 4 months.]

Killed when in good health—December 1, 1909. [91 days after inoculation.]

Clinical Notes.

The calf remained well during the experiment and grew normally.

Temperature.

On the 6th day after inoculation the temperature rose to 40·0° C.; it reached a maximum of 40·9° C. on the 10th day and then gradually fell, becoming normal on the 24th day. The temperature was normal during the remaining period of the experiment.

Tuberculin Test.

October 29, 1909. [58 days after inoculation.] Dose 2·0 cc. Reacted. Rise of temperature, 2·0° C.

Weights.

	cwt.	qrs.	lbs.
September 1, 1909 ...	1	1	14
December 1, 1909 ...	2	0	6

Total gain of weight.—2 qrs. 20 lbs.

Average rate of gain per week.—5·8 lbs.

POST-MORTEM EXAMINATION.

The carcass was fat.

Local Lesion.—The local lesion on the left side of the neck was a tense fibrous-walled cyst measuring 13 by 9 by 5 cm. containing thin yellow pus and caseo-necrotic masses.

Left Prescapular Gland.—The left prescapular gland measured 6 by 3·5 by 2·5 cm. and showed in its centre a mass 3·5 cm. in length dense and caseous around the margin, fibrous in the centre.

Right Prescapular Gland.—The right prescapular gland measured 5 by 2 by 1 cm. and was normal on section.

Prepectoral Glands.—On the left side one 1 cm. in diameter was composed throughout of dense fibro-caseous substance; the rest were normal.

Cervical Glands.—On the left side the upper cervical contained a dense yellow caseo-calcareous nodule 1 cm. in diameter. The rest were normal.

Thorax.

Lungs.—The lungs were crepitant throughout; under the pleura about half-a-dozen minute grey tubercles with calcareous centres were seen. None was seen on section.

Abdomen.

Suprarenal Bodies.—In the cortex of the left there were seven caseous tubercles with grey margins the largest a little more than 1 millimetre in diameter. In that of the right there were eight similar tubercles. [Microscopical examination of a smear from the tubercles showed a moderate number of tubercle bacilli.]

Ileo-colic Glands.—The cortices of these glands contained a moderate number of minute yellow caseous or caseo-calcareous foci.

Udder.—The udder was small and showed only a small amount of glandular tissue. There was no sign of tuberculosis.

The remaining organs and glands were examined and found normal.

Four cubic centimetres of saline solution were injected into each of the four quarters of the mamma, and about 3 cc. were recovered in each case. The recovered fluid was slightly milky.

Microscopical Examinations of the Fluids.

Fluid from L.F. quarter.	Two tubercle bacilli seen.	Each smear showed numerous alveolar cells and some epithelium cells.
Fluid from R.F. quarter.	One tubercle bacillus seen.	
Fluid from L.H. quarter.	No tubercle bacilli.	
Fluid from R.H. quarter.	Two tubercle bacilli seen.	

Guinea-pigs Inoculated with the Fluids.

Fluid from	L.F.	3931 (P.).	Dose 3·0 cc.
„ „	R.F.	3930 (P.).	„ 3·0 cc.
„ „	L.H.	3933 (P.).	„ 3·0 cc.
„ „	R.H.	3932 (P.).	„ 3·0 cc.

No. 3933 died in 47 days, the rest were killed after 70 days; all showed general tuberculosis.

KITTENS 69 and 71. Virus H. 143. "L.L."

Intraperitoneal inoculations with culture derived from human sputum through Guinea-pig 3536.

Doses—10·0 milligrammes each.

Date of Inoculations—July 28, 1909.

Killed when in good health—December 21, 1909. [146 days after inoculation.]

Weights.

	(69)	(71)
July 28, 1909	1250 gr.	1020 gr.
December 21, 1909 ...	2320 gr.	1880 gr.

POST-MORTEM EXAMINATIONS.

All the organs and glands were examined in each case, and no sign of tuberculosis was found.

VIRUS H. 144. "D.B."

SPUTUM.

CULTURE INOCULATIONS.

April 28, 1909.

The strain was derived from the original material through Guinea-pig 3614, and had been 33 days in artificial cultivation.

The culture used was the 3rd generation, 11 days old.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
3740	Intrap.	0·1 mg.	D. 23 days	G. T.
3741	Subcut.	0·1 mg.	D. 49 „	G. T.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2333	Intrav.	0·1 mg.	K. 107 days	Slight T. of lungs, kidneys, and lachrymal glands.
2332	Intrav.	0·01 mg.	K. 107 „	Slight T. of lungs, kidneys, and a lachrymal gland.
2335	Subcut.	100·0 mg.	K. 107 „	Local lesion and slight T. of lungs.
2334	Subcut.	10·0 mg.	K. 107 „	Local lesion and slight T. of lungs.

June 24–25, 1909.

FEEDING EXPERIMENT.

The strain was derived from the original material through Guinea-pig 3614. The 8th generation of culture, 7 and 8 days old, was used.

PARROT 17.

Fed.

Dose : 2 serum cultures on each of two successive days.

Killed : March 21, 1910. 270 days.

P.M. One miliary caseous tubercle in lung only.

VIRUS H. 145. "G.W."
SPUTUM.

CULTURE INOCULATIONS.

April 6, 1909.

The strain was derived from the original material through Guinea-pig 3540 (sternal gland) and had been 28 days in artificial cultivation. The culture used was the 3rd generation, 7 days old.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
3683	Intrap.	0·1 mg.	D. 16 days	Early G. T.
3684	Subcut.	0·1 mg.	D. 37 "	G. T.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2287	Intrav.	0·1 mg.	K. 127 days	Slight T. of lungs, kidneys, and lachrymal glands.
2286	Intrav.	0·01 mg.	D. 92 "	Slight T. of lungs, spleen, and kidneys.
2289	Subcut.	30·0 mg.	K. 127	Local T. and slight T. of lungs and one kidney.
2288	Subcut.	10·0 mg.	K. 127	Local lesion and one nodule in the lung.

June 24–25, 1909.

FEEDING EXPERIMENT.

The strain was derived from the original material through Guinea-pig 3540. The 9th generation of culture, 16 and 17 days old, was used.

PARROT 19.
Fed.
Dose : 2 serum cultures on each of two successive days.
Killed : March 21, 1910. 270 days.
P.M. No tuberculosis.

VIRUS H. 147. "P.C."
SPUTUM.

CULTURE INOCULATIONS.

The strain was derived from the original material through Guinea-pig 3832, and was inoculated on December 3, 1909, when it had been 82 days in artificial cultivation. The culture used was the 5th generation, 15 days old.

RABBITS.

Number.	Method.	Dose.	Duration of Life.	Result.
2480	Subcut.	10·0 mg.	K. 103 days	Local lesion and slight T. of lungs.
2481	Subcut.	10·0 mg.	K. 103 "	Local lesion and T. of lungs.
2482	Subcut.	10·0 mg.	K. 103 "	Local lesion and slight T. of lungs and kidneys.

GUINEA-PIGS.

Number.	Method.	Dose.	Duration of Life.	Result.
3934	Subcut.	1·0 mg.	D. 122 days	Chronic G. T.
3935	Subcut.	1·0 mg.	D. 151 "	Chronic G. T.
3936	Subcut.	1·0 mg.	D. 46 "	G. T.
3937	Subcut.	1·0 mg.	D. 90 "	G. T.
3938	Subcut.	1·0 mg.	D. 103 "	Chronic G. T.
3939	Subcut.	1·0 mg.	D. 70 "	G. T.
3940	Subcut.	1·0 mg.	D. 71 "	G. T.
3941	Subcut.	1·0 mg.	D. 61 "	G. T.
3942	Subcut.	1·0 mg.	D. 102 "	G. T., not severe.
3943	Subcut.	1·0 mg.	D. 49 "	G. T.

DETAILS OF FEEDING EXPERIMENTS OF SHORT DURATION.

(*See* pages 50, 51, and 52.)

PIG 141. Virus H. 110. "J.B." (*b*).

(8 weeks old)

Fed on two successive days with 50·0 mg. of culture derived from the original material of Virus H. 110. "J.B." (*b*) through Guinea-pig 3289, plus half a tablet of China ink; another half tablet of China ink was given on the third day.

The pig thus received 100·0 mg. of culture and one and a half tablets of China ink.

Date of Feeding—February 2–3, 1909. [Weight 25 lbs.]

Killed—February 9, 1909. Seven days after the first feeding.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

The submaxillary glands were slightly pigmented.

There were no deposits of pigment in the tonsils, intestines, mesenteric glands, or lungs.

The organs and glands of the pig were free from macroscopic tuberculosis.

Microscopical Examination.

Smear from contents of Duodenum.—A few acid-fast organisms (? tubercle bacilli).

Smear from contents of Ileum.—No tubercle bacilli.

Smear from contents of Rectum.—A moderate number of tubercle bacilli.

Emulsion of Submaxillary Gland	No tubercle bacilli.
" *Mesenteric Gland* ...	
" *Bronchial Gland* ...	
" *Lung*	
" *Liver*	
" *Spleen*	

GUINEA-PIGS INOCULATED WITH EMULSIONS OF VARIOUS TISSUES AND THE BLOOD.

ALL INTRAPERITONEAL.

Tissue or Fluid Inoculated.	Number of Guinea-pig.	Duration of Life.	Result.
E. of submaxillary gland ...	3470	Died 25 days	Early general tuberculosis (not severe).
	3471	Died 24 "	Early general tuberculosis.
E. of mesenteric gland	3472	Died 35 "	Slight general tuberculosis.
	3473	Died 4 "	Subacute infection.
E. of lung	3464	Killed 56 "	Slight T. of omentum and nearest glands.
	3465	Died 44 "	Slight general tuberculosis.
E. of liver	3466	Killed 56 "	No tuberculosis.
	3467	Killed 56 "	No tuberculosis.
E. of spleen	3468	Killed 56 "	No tuberculosis.
E. of bronchial gland	3469	Killed 56 "	No tuberculosis.
Heart's blood (dose 5·0 cc. each)	3462	Killed 56 "	No tuberculosis.
	3463	Killed 56 "	No tuberculosis.

PIG 143. Virus H. 110. "J.B." (*b*).

(8 weeks old.)

Fed on two successive days with 50·0 mg. of culture derived from the original material of Virus H. 110. "J.B." (*b*) through Guinea-pig 3289, plus half a tablet of China ink; another half tablet of China ink was given on the third day.

The pig thus received 100·0 mg. of culture and one and a half tablets of China ink.

Date of Feeding—February 2–3, 1909. [Weight 1 qr.]

Killed—February 15, 1909. Thirteen days after the first feeding.

POST-MORTEM EXAMINATION.

The carcass was in good condition.

Tonsils.—In the substance of each tonsil there were a few yellow foci which did not shell out.

Submaxillary Glands.—The right showed on section a yellow focus of necrosis; the whole of the left was made into an emulsion. There was no pigmentation of the gland tissue.

Intestines.—Normal.

Mesenteric Glands.—Normal in size and appearance.

The other organs and glands were free from pigment and showed no sign of tuberculosis.

Microscopical Examination.

Yellow Focus from Tonsil.—A moderate number of tubercle bacilli.

Emulsion of Left Submaxillary Gland.—A moderate number of tubercle bacilli.

Yellow Focus from Right Submaxillary Gland.—Moderately numerous tubercle bacilli.

Emulsion of Mesenteric Gland.—One tubercle bacillus seen.

Emulsion of Liver	No tubercle bacilli.
Emulsion of Lung	
Emulsion of Spleen	
Smear from Mucous Membrane of Duodenum:	
Smear from Mucous Membrane of Ileum:	
Smear from Mucous Membrane of Rectum:	

GUINEA-PIGS INOCULATED WITH EMULSIONS OF VARIOUS TISSUES AND THE BLOOD.

All Intraperitoneal.

Tissue or Fluid Inoculated.	Number of Guinea-pig.	Duration of Life.	Result.
E. of left submaxillary gland ...	3507	Died 16 days	Early general tuberculosis.
	3508	Died 30 „	General tuberculosis.
E. of mesenteric gland	3505	Died 38 „	General tuberculosis.
	3506	Died 35 „	General tuberculosis.
E. of lung	3502	Died 37 „	Slight general tuberculosis.
	3503	Killed 57 „	Slight generalised tuberculosis (omentum only slightly affected).
E. of liver	3500	Killed 57 „	No tuberculosis.
	3501	Killed 57 „	No tuberculosis.
E. of spleen	3504	Killed 57 „	No tuberculosis.
Heart's blood (dose 10·0 cc. each)	3498	Killed 57 „	No tuberculosis.
	3499	Killed 57 „	No tuberculosis.

PIG 123. Virus H. 104. "E.R."

(Age 16 weeks.)

Fed with culture derived from the human lung, direct.

Dose—377·0 milligrammes.

Date of Feeding—May 16, 1908. [Weight 3 qrs.]

Killed—May 21, 1908. Five days later.

POST-MORTEM EXAMINATION.

All the organs and glands were examined and appeared to be perfectly normal.

Microscopical Examination.

Faeces from Rectum.—Tubercle bacilli moderately numerous.

Faeces from Ileum.—A few tubercle bacilli.

Faeces from Duodenum.—No tubercle bacilli.

Emulsion of Submaxillary Gland.—No tubercle bacilli.

Emulsion of Mesenteric Gland.—One tubercle ? bacillus seen.

Emulsion of Bronchial Gland	No tubercle bacilli.
Emulsion of Lung	
Emulsion of Spleen	
Emulsion of Liver	
Emulsion of Muscle	

GUINEA-PIGS INOCULATED WITH EMULSIONS OF VARIOUS TISSUES AND THE BLOOD.

All Intraperitoneal.

Tissue or Fluid Inoculated.	Number of Guinea-pig.	Duration of Life.	Result.
E. of submaxillary gland ...	3071	Died 2 days	Peritonitis.
	3072	Died 1 day	Peritonitis.
E. of mesenteric glands	3073	Killed 68 days	General tuberculosis.
	3074	Died 13 „	Peritonitis.
E. of lung	3066	Killed 68 „	No tuberculosis.
	3067	Killed 68 „	No tuberculosis.
E. of liver	3069	Killed 68 „	No tuberculosis.
	3070	Killed 68 „	No tuberculosis.
E. of spleen	3068	Killed 68 „	No tuberculosis.
E. of bronchial gland	3065	Killed 68 „	No tuberculosis.
Heart's blood	3061 (7·0 cc.).	Killed 68 „	No tuberculosis.
	3062 (2·5 cc.).	Killed 68 „	No tuberculosis.
E. of muscle	3063	Killed 68 „	No tuberculosis.
	3064	Killed 68 „	No tuberculosis.

PIG 105. Virus H. 70. "N.W."

(Age 12½ weeks.)

Fed with culture derived from the human lung direct.

Dose—50·0 milligrammes.

Date of Inoculation—April 15, 1907. [Weight 1 qr. 21 lbs.]

Killed—April 17. 48 hours later.

POST-MORTEM EXAMINATION.

All the organs and glands were examined, and no trace of tuberculosis or other disease was discovered.

GUINEA-PIGS INOCULATED WITH EMULSIONS OF VARIOUS TISSUES AND THE BLOOD.

ALL INTRAPERITONEAL.

Tissue or Fluid Inoculated.	Number of Guinea-pig.	Duration of Life.	Result.
E. of submaxillary gland ...	2359	Died 3 days	Cause of death not apparent.
	2360	Died 12 „	Pseudo-tuberculosis.
E. of mesenteric gland... ...	2361	Killed 50 „	General tuberculosis.
	2362	Died 1 day	Pseudo-tuberculosis.
E. of lung	2355	Died 24 days	Pseudo-tuberculosis ; no sign of T.
	2356	Killed 50 „	No tuberculosis.
E. of liver	2353	Died 1 day	Pseudo-tuberculosis.
	2354	Died 25 days	An acute infection. No sign of T.
E. of spleen	2351	Died 2 „	Pseudo-tuberculosis.
	2352	Killed 50 „	No tuberculosis.
E. of bronchial gland	2357	Killed 50 „	No tuberculosis.
	2358	Killed 50 „	No tuberculosis.
E. of blood	2347 (4·0 cc.).	Killed 50 „	No tuberculosis.
	2348 (4·0 cc.).	Killed 50 „	No tuberculosis.

PIG 103. Virus H. 70. "N.W."

(Age 12½ weeks.)

Fed with culture derived from the human lung, direct.

Dose—50·0 milligrammes.

Date of Feeding—April 15, 1907. [Weight 1 qr. 19 lbs.]

Killed—April 19. Four days later.

POST-MORTEM EXAMINATION.

All the organs and glands were examined, and no trace of tuberculosis or other disease was discovered.

Microscopical Examination.

Emulsion of Submaxillary Gland	No tubercle bacilli.
Emulsion of Mesenteric Gland	

GUINEA-PIGS INOCULATED WITH EMULSIONS OF VARIOUS TISSUES AND THE BLOOD.

ALL INTRAPERITONEAL.

Tissue or Fluid Inoculated.	Number of Guinea-pig.	Duration of Life.	Result.
E. of submaxillary gland ...	2379	Killed 49 days	No tuberculosis.
	2380	Killed 49 „	No tuberculosis.
E. of mesenteric gland	2381	Killed 49 „	General tuberculosis.
	2382	Died 2 „	Pseudo-tuberculosis.

GUINEA-PIGS INOCULATED WITH EMULSIONS OF VARIOUS TISSUES AND THE BLOOD—*continued.*

ALL INTRAPERITONEAL—*continued.*

Tissue or Fluid Inoculated.	Number of Guinea-pig.	Duration of Life.	Result.
E. of lung	2377	Killed 49 days	No tuberculosis.
	2378	Killed 49 „	No tuberculosis.
E. of liver	2371	Killed 49 „	No tuberculosis.
	2372	Killed 49 „	No tuberculosis.
E. of spleen	2369	Killed 49 „	No tuberculosis.
	2370	Killed 49 „	No tuberculosis.
E. of bronchial gland	2375	Killed 49 „	No tuberculosis.
	2376	Killed 49 „	No tuberculosis.
Heart's blood	2367 (5·0 cc.).	Killed 49 „	No tuberculosis.
	2368 (5·0 cc.).	Killed 49 „	No tuberculosis.
E. of muscle	2373	Killed 49 „	No tuberculosis.
	2374	Killed 49 „	No tuberculosis.

PIG 125. Virus H. 67. "E.P."

(Age about 12 weeks.)

Fed with an emulsion made from the tuberculous organs of six Guinea-pigs, Nos. 3170–3175, inoculated with culture derived from Calf 1329 (4th passage culture).

Dose—About 75·0 cc. of the emulsion, mixed with milk. The emulsion contained numerous beaded tubercle bacilli, many in clumps.

Date of Feeding—August 20, 1908. [Weight 1 qr. 17 lbs.]

Killed—August 27, 1908. Seven days later.

POST-MORTEM EXAMINATION.

All the glands and organs were examined and showed no macroscopic evidence of tuberculosis or any other morbid process.

Microscopical Examination.

Scraping from Mucous Membrane of Duodenum.—No tubercle bacilli.

Scraping from Mucous Membrane of Ileum.—Two tubercle bacilli seen.

Scraping from Mucous Membrane of Caecum.—Small group of short stout acid-fast bacilli and one long curved bacillus.

Scraping from Mucous Membrane of Rectum.—Moderately numerous tubercle bacilli, mostly short plump and well-stained.

GUINEA-PIGS INOCULATED WITH EMULSIONS OF VARIOUS TISSUES AND THE BLOOD.

ALL INTRAPERITONEAL.

Tissue or Fluid Inoculated.	Number of Guinea-pig.	Duration of Life.	Result.
E. of submaxillary gland ...	3242	Killed 68 days	General tuberculosis.
	3243	Died 46 „	General tuberculosis.
E. of mesenteric gland	3244	Killed 68 „	General tuberculosis.
	3245	Killed 68 „	General tuberculosis.
E. of lung	3237	Killed 68 „	No tuberculosis.
	3238	Killed 68 „	No tuberculosis.
E. of liver	3235	Killed 68 „	No tuberculosis.
	3236	Killed 68 „	No tuberculosis.
E. of spleen	3234	Killed 68 „	No tuberculosis.
E. of bronchial gland	3239	Killed 68 „	No tuberculosis.

GUINEA-PIGS INOCULATED WITH EMULSIONS OF VARIOUS TISSUES AND THE BLOOD—*continued.*

ALL INTRAPERITONEAL—*continued.*

Tissue or Fluid Inoculated.	Number of Guinea-pig.	Duration of Life.	Result.
Blood	3232 (5·0 cc)	Killed 68 days	No tuberculosis.
	3233 (5·0 cc.).	Killed 68 „	No tuberculosis.
E. of muscle	3240	Killed 68 „	No tuberculosis.
	3241	Killed 68 „	No tuberculosis.

PIG 127. Virus H. 67. "E.P."

(Age about 12 weeks.)

Fed with an emulsion made from the tuberculous organs of six guinea-pigs, Nos. 3170–3175, inoculated with culture derived from Calf 1329 (4th passage culture).

Dose—About 75·0 cc. of the emulsion, mixed with milk. The emulsion contained numerous beaded tubercle bacilli, many in clumps.

Date of Feeding—August 20, 1908. [Weight 1 qr. 18 lbs.]

Killed—September 1, 1908. 12 days later.

POST-MORTEM EXAMINATION.

All the glands and organs were examined and showed no macroscopic evidence of tuberculosis or any other morbid process.

Microscopical Examination.

Emulsion of Submaxillary Gland.—14 tubercle bacilli were seen, the majority in pairs.

Emulsion of Mesenteric Gland.—No tubercle bacilli.

GUINEA-PIGS INOCULATED WITH EMULSIONS OF VARIOUS TISSUES AND THE BLOOD.

ALL INTRAPERITONEAL.

Tissue or Fluid Inoculated.	Number of Guinea-pig.	Duration of Life.	Result.
E. of submaxillary gland ...	3258	Died 8 days	Volvulus.
	3259	Died 48 „	Severe general tuberculosis.
E. of mesenteric gland	3260	Died 38 „	General tuberculosis.
	3261	Died 67 „	General tuberculosis.
E. of lung	3253	Killed 69 „	No tuberculosis.
	3254	Killed 69 „	No tuberculosis.
E. of liver	3251	Killed 69 „	No tuberculosis.
	3252	Killed 69 „	No tuberculosis.
E. of spleen	3250	Killed 69 „	No tuberculosis.
E. of bronchial gland	3255	Killed 69 „	No tuberculosis.
Blood	3248 (5·0 cc.).	Killed 69 „	No tuberculosis
	3249 (5·0 cc.).	Died 6 „	Peritonitis.
E. of muscle	3256	Killed 69 „	No tuberculosis.
	3257	Killed 69 „	No tuberculosis.

PIGS 149 and 151.

(11 weeks old.)

Fed with culture derived from human sputum through Guinea-pig 3832 (Virus H. 147. "P.C.").

Dose—Two doses of 50·0 milligrammes each were given on the same day (morning and afternoon); each pig thus received 100·0 milligrammes.

Date of Feeding—March 11, 1910.

Killed—March 18, 1910. [7 days after feeding.]

Pig 149.

POST-MORTEM EXAMINATION.

All the organs and glands were examined and found normal.

Microscopical Examination.

Emulsion of Submaxillary Gland.—No tubercle bacilli.

Emulsion of Mesenteric Gland.—No tubercle bacilli.

Emulsion of Ileo-colic Gland.—No tubercle bacilli.

Scraping from mucous membrane of Ileum.—No tubercle bacilli.

Faeces from Rectum.—No tubercle bacilli.

GUINEA-PIGS INOCULATED WITH EMULSIONS OF VARIOUS TISSUES.

ALL INTRAPERITONEAL.

Tissue Emulsion Inoculated.	Number of Guinea-pig.	Duration of Life.	Result.
E. of submaxillary glands ...	4043	Killed 39 days	Slight general tuberculosis.
	4044	Died 39 ,,	Slight general tuberculosis.
E. of mesenteric glands	4045	Killed 39 ,,	Slight general tuberculosis.
	4046	Killed 39 ,,	Slight general tuberculosis.
E. of ileo-colic glands	4047	Died 11 ,,	Pseudo-tuberculosis.
	4048	Died 11 ,,	Pseudo-tuberculosis.
E. of lung	4041	Killed 39 ,,	Very slight general tuberculosis.
	4042	Killed 39 ,,	Very slight general tuberculosis.
E. of spleen	4037	Killed 39 ,,	Healthy.
	4038	Killed 39 ,,	Healthy.
E. of liver	4039	Killed 39 ,,	Healthy.
	4040	Killed 39 ,,	Healthy.

Pig 151.

POST-MORTEM EXAMINATION.

All the organs and glands were examined and found normal.

Microscopical Examination.

Emulsion of Submaxillary Gland.—No tubercle bacilli.

Emulsion of Mesenteric Gland
Emulsion of Ileo-colic Gland } No tubercle bacilli.

Scraping from mucous membrane of Ileum. } A moderate number of tubercle bacilli and acid-fast bacilli.

Faeces from Rectum.—No tubercle bacilli.

GUINEA-PIGS INOCULATED WITH EMULSIONS OF VARIOUS TISSUES.

ALL INTRAPERITONEAL.

Tissue Emulsion Inoculated.	Number of Guinea-pig.	Duration of Life.	Result.
E. of submaxillary glands ...	4055	Killed 39 days	General tuberculosis.
	4056	Died 28 ,,	Early general tuberculosis.
E. of mesenteric glands	4057	Died 31 ,,	Slight general tuberculosis.
	4058	Killed 39 ,,	Slight general tuberculosis.
E. of ileo-colic glands	4059	Killed 39 ,,	Slight general tuberculosis.
	4060	Died 12 ,,	Pseudo-tuberculosis.
E. of lung	4053	Killed 39 ,,	Very slight general tuberculosis.
	4054	Killed 39 ,,	No tuberculosis.
E. of spleen	4049	Killed 39 ,,	No tuberculosis.
	4050	Killed 39 ,,	No tuberculosis.
E. of liver	4051	Killed 39 ,,	No tuberculosis.
	4052	Died 31 ,,	No tuberculosis.

RHESUS MONKEYS 371, 373, and 375.

(Young animals.)

Fed each with 50·0 milligrammes of culture derived from human sputum through Guinea-pig 3832 (Virus H. 147. "P.C.").

Date of Feeding—March 9, 1910.

Monkey 371.

Killed—March 11, 1910. [48 hours after feeding.]

POST-MORTEM EXAMINATION.

All the organs and glands were examined and found normal.

Microscopical Examination.

Emulsion of Submaxillary Gland.—A few tubercle bacilli.

Emulsion of Mesenteric Gland
Emulsion of Ileo-colic Gland } A few acid-fast granules; no tubercle bacilli.

Scraping from Buccal Mucous Membrane. — No tubercle bacilli.

Faeces from Duodenum
Faeces from Ileum } No tubercle bacilli.

Faeces from Rectum.—Tubercle bacilli moderately numerous.

GUINEA-PIGS INOCULATED WITH EMULSIONS OF VARIOUS TISSUES.

ALL INTRAPERITONEAL.

Tissue Emulsion Inoculated.	Number of Guinea-pig.	Duration of Life.	Result.
E. of submaxillary gland ...	4007	Killed 42 days	No tuberculosis.
	4008	Killed 42 "	No tuberculosis.
E. of mesenteric gland	4009	Killed 42 "	No tuberculosis.
	4010	Killed 42 "	No tuberculosis.
E. of ileo-colic glands	4011	Killed 42 "	No tuberculosis.
	4012	Killed 42 "	No tuberculosis.
E. of lung	4005	Died 26 "	No tuberculosis.
	4006	Killed 42 "	No tuberculosis.
E. of spleen	4001	Killed 42 "	No tuberculosis.
	4002	Killed 42 "	No tuberculosis.
E. of liver	4003	Killed 42 "	No tuberculosis.
	4004	Killed 42 "	No tuberculosis.

Monkey 373.

Killed—March 13, 1910. [4 days after feeding.]

POST-MORTEM EXAMINATION.

All the organs and glands were examined and found normal.

Microscopical Examination.

Emulsion of Submaxillary Gland ...
Emulsion of Mesenteric Gland ...
Emulsion of Ileo-colic Gland ...
Faeces from Duodenum ... ...
Faeces from Ileum ... ... } No tubercle bacilli.

Faeces from Rectum.—A few tubercle bacilli.

GUINEA-PIGS INOCULATED WITH EMULSIONS OF VARIOUS TISSUES.

ALL INTRAPERITONEAL.

Tissue Emulsion Inoculated.	Number of Guinea-pig.	Duration of Life.	Result.
E. of submaxillary glands ...	4019	Killed 40 days	No tuberculosis.
	4020	Killed 40 "	No tuberculosis.
E. of mesenteric glands	4021	Killed 40 "	Slight general tuberculosis.
	4022	Killed 40 "	Slight general tuberculosis.
E. of ileo-colic glands	4023	Killed 40 "	No tuberculosis.
	4024	Killed 40 "	No tuberculosis.

GUINEA-PIGS INOCULATED WITH EMULSIONS OF VARIOUS TISSUES—*continued.*

ALL INTRAPERITONEAL—*continued.*

Tissue Emulsion Inoculated.	Number of Guinea-pig.	Duration of Life.	Result.
E. of lung	4017	Died 19 days.	Early general tuberculosis.
	4018	Died 19 „	Early general tuberculosis.
E. of spleen	4013	Died 32 „	Slight general tuberculosis.
	4014	Killed 40 „	Slight general tuberculosis.
E. of liver	4015	Killed 40 „	Slight general tuberculosis.
	4016	Killed 40 „	Slight general tuberculosis.

Monkey 375.

Killed—March 15, 1910. [6 days after feeding.]

POST-MORTEM EXAMINATION.

All the organs and glands were examined and found normal.

Microscopical Examination.

Emulsion of Submaxillary Gland
Emulsion of Mesenteric Gland ...
Emulsion of Ileo-colic Gland ...
} No tubercle bacilli.

Faeces from Duodenum ... ...
Faeces from Ileum ... ...
Faeces from Rectum ... ...
} No tubercle bacilli.

GUINEA-PIGS INOCULATED WITH EMULSIONS OF VARIOUS TISSUES.

ALL INTRAPERITONEAL.

Tissue Emulsion Inoculated.	Number of Guinea-pig.	Duration of Life.	Result.
E. of submaxillary gland ...	4031	Killed 39 days	Slight general tuberculosis.
	4032	Killed 39 „	Slight general tuberculosis.
E. of mesenteric gland	4033	Killed 39 „	Slight general tuberculosis.
	4034	Killed 39 „	Slight general tuberculosis.
E. of ileo-colic glands	4035	Died 16 „	No tuberculosis ; ? cause of death.
	4036	Killed 39 „	No tuberculosis.
E. of lung	4029	Died 7 „	Peritonitis.
	4030	Died 7 „	Peritonitis.
E. of spleen	4025	Killed 39 „	One tubercle in omentum ; partial caseation of portal glands.
	4026	Killed 39 „	No tuberculosis.
E. of liver	4027	Killed 39 „	No tuberculosis.
	4028	Killed 39 „	No tuberculosis.

GOAT 73. Virus H. 147. "P.C."

(Adult male.)

Fed on two successive days with culture derived from the original material (sputum).

Dose—50·0 milligrammes on each occasion.

Date of Feeding—December 3–4, 1909. [Weight 2 qrs. 26 lbs.]

Killed—December 11, 1909. [8 days after first feed.]

POST-MORTEM EXAMINATION.

All the organs and glands were examined, and appeared healthy.

Microscopical Examinations.

Emulsion of Submaxillary Gland.—No tubercle bacilli.

Emulsion of Mesenteric Gland
Contents of Duodenum... ...
Contents of Ileum ... ...
Contents of Rectum ... ...
} No tubercle bacilli.

GUINEA-PIGS INOCULATED WITH EMULSIONS OF VARIOUS TISSUES.

All Intraperitoneal.

Tissue Emulsion Inoculated.	Number of Guinea-pig.	Duration of Life.	Result.
E. of submaxillary gland ...	3962	Died 59 days	General tuberculosis.
	3963	Died 59 "	General tuberculosis.
E. of mesenteric gland	3960	Killed 70 "	Slight general tuberculosis.
	3961	Killed 70 "	Slight general tuberculosis.
E. of lung	3958	Killed 70 "	General tuberculosis, not severe.
	3959	Died 53 "	General tuberculosis, not severe.
E. of spleen	3954	Died 60 "	No tuberculosis.
	3955	Killed 70 "	No tuberculosis.
E. of liver	3956	Died 60 "	No tuberculosis.
	3957	Killed 70 "	No tuberculosis.

CAT 79. Virus H. 147. "P.C."

(Adult Female.)

Fed once with culture derived from the original material (sputum) through Guinea-pig 3832.

Dose—50·0 milligrammes.

Date of Feeding—December 4, 1909.

Killed—December 13, 1909. 9 days later.

POST-MORTEM EXAMINATION.

All the organs and glands were examined and appeared healthy.

Microscopical Examination.

Emulsion of Submaxillary Gland.—No tubercle bacilli.

Emulsion of Mesenteric Gland.—No tubercle bacilli.

GUINEA-PIGS INOCULATED WITH EMULSIONS OF VARIOUS TISSUES.

All Intraperitoneal.

Tissue Emulsion Inoculated.	Number of Guinea-pig.	Duration of Life.	Result.
E. of submaxillary gland ...	3972	Killed 63 days	General tuberculosis, not severe.
	3973	Died 51 "	General tuberculosis.
E. of mesenteric gland	3970	Died 34 "	General tuberculosis.
	3971	Died 14 "	Early general tuberculosis.
E. of lung	3968	Died 58 "	Early general tuberculosis.
	3969	Killed 63 "	Slight general tuberculosis.
E. of spleen	3964	Killed 63 "	General tuberculosis, not severe.
	3965	Killed 63 "	General tuberculosis, not severe.
E. of liver	3966	Killed 63 "	General tuberculosis, not severe.
	3967	Killed 63 "	General tuberculosis, not severe.

PIG 83. Virus H. 68. "R.B."

(9 weeks old.)

Subcutaneous inoculation (in the left ear) of culture derived from the original material.

Dose—20·0 milligrammes.

Date of Inoculation—November 21, 1906. [Weight 32 lbs.]

Killed—November 22. [24 hours after inoculation.]

POST-MORTEM EXAMINATION.

All the organs and glands were examined and appeared healthy.

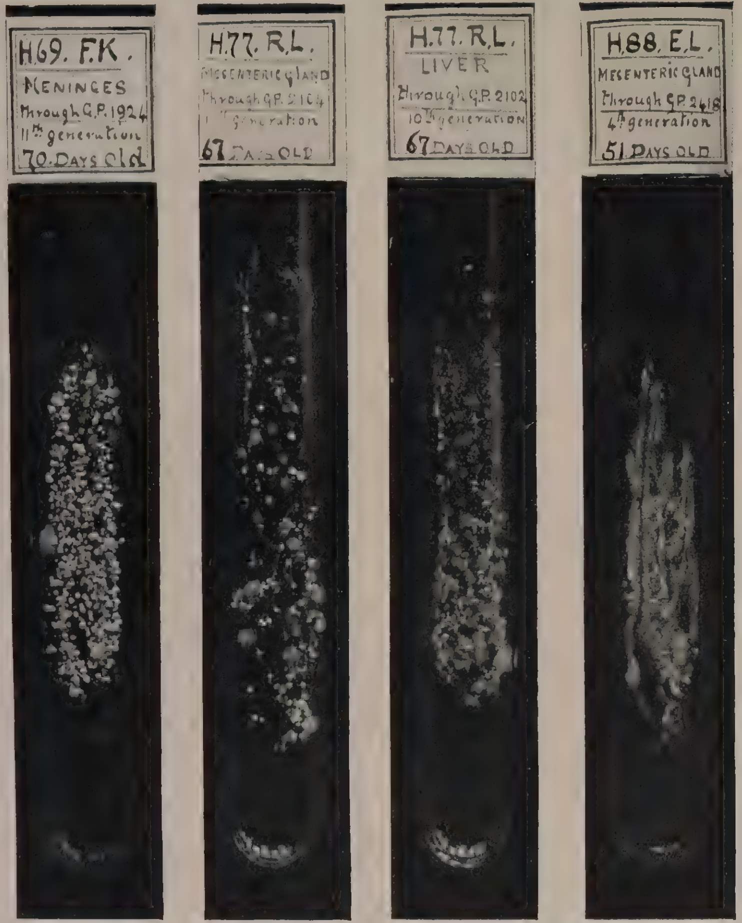
Microscopical Examination.

Emulsion of Lung *Emulsion of Liver* *Emnlsion of Spleen*	No tubercle bacilli seen.

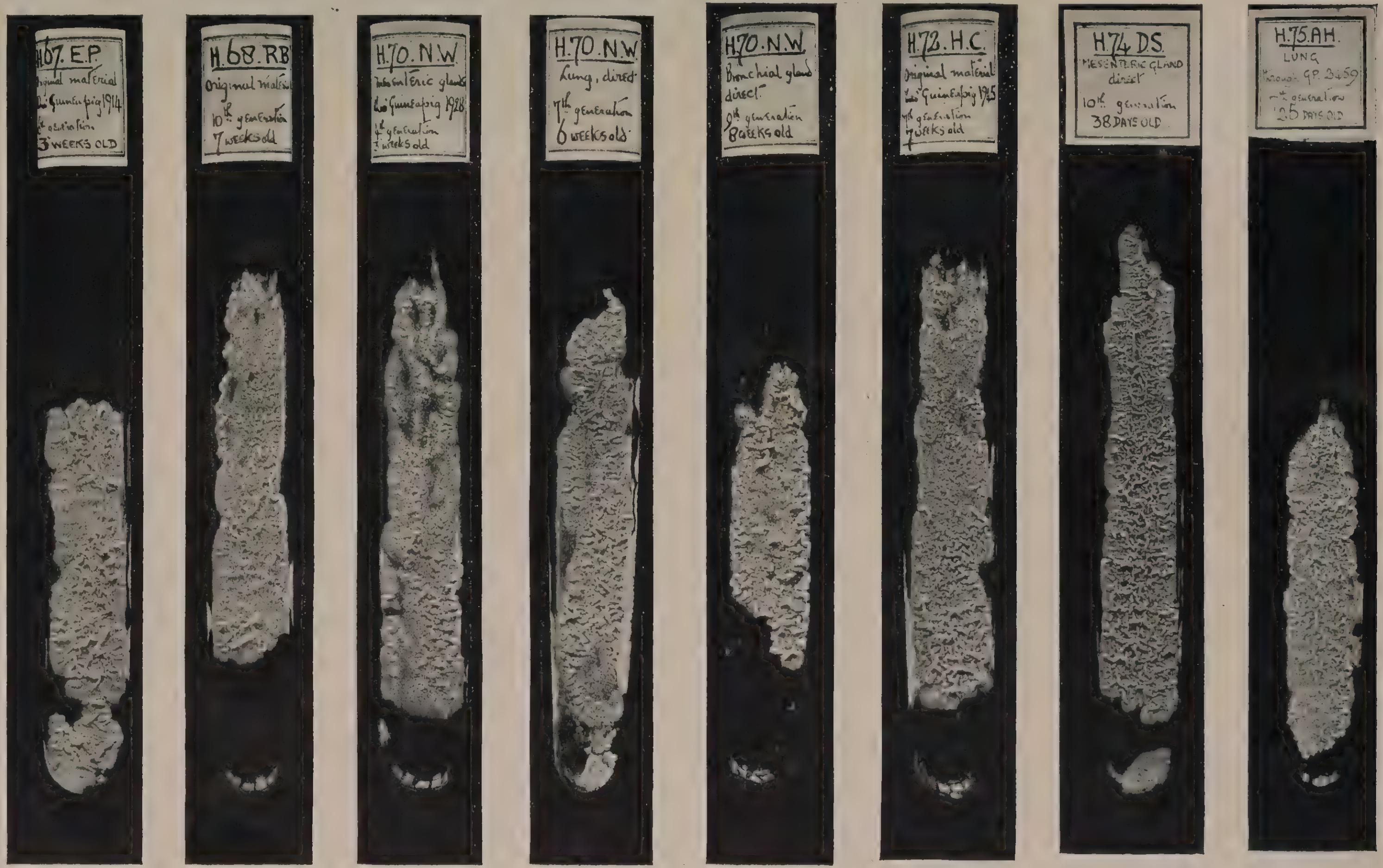
GUINEA-PIGS INOCULATED WITH EMULSIONS OF VARIOUS TISSUES AND THE BLOOD.

ALL INTRAPERITONEAL.

Tissue or Fluid Inoculated.	Number of Guinea-pig.	Duration of Life.	Result.
Blood	2005 (2·0 cc.).	Killed 41 days	Slight general tuberculosis.
	2006 (2·0 cc.).	Killed 41 „	Slight general tuberculosis.
E. of lung	2011	Killed 41 „	General tuberculosis.
	2012	Killed 41 „	Slight general tuberculosis.
E. of liver	2009	Killed 41 „	General tuberculosis.
	2010	Killed 41 „	Slight general tuberculosis.
E. of spleen	2007	Killed 41 „	General tuberculosis.
	2008	Killed 41 „	General tuberculosis.
E. of precrural gland	2015	Killed 41 „	Slight general tuberculosis.
E. of marrow (of right femur)...	2016	Killed 41 „	Slight general tuberculosis.
E. of muscle	2013	Killed 41 „	No tuberculosis.
	2014	Killed 41 „	No tuberculosis.

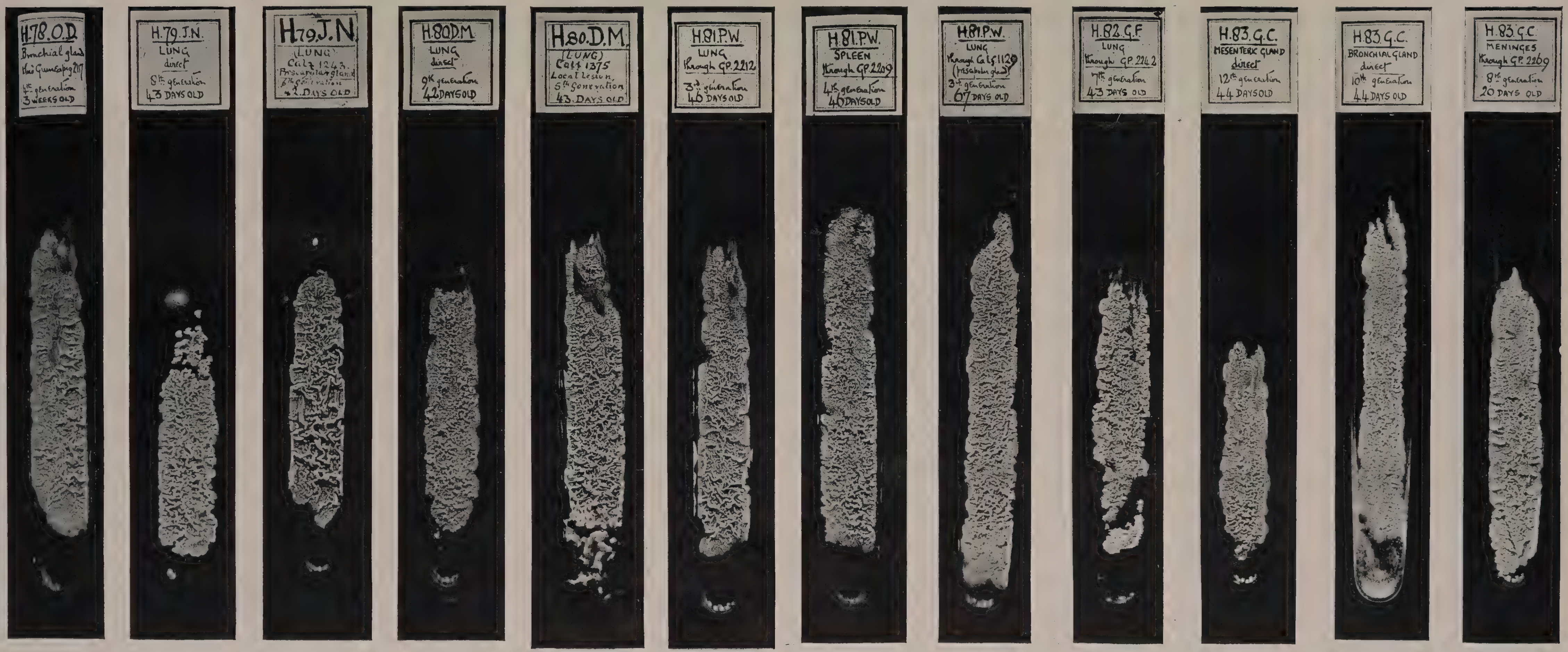


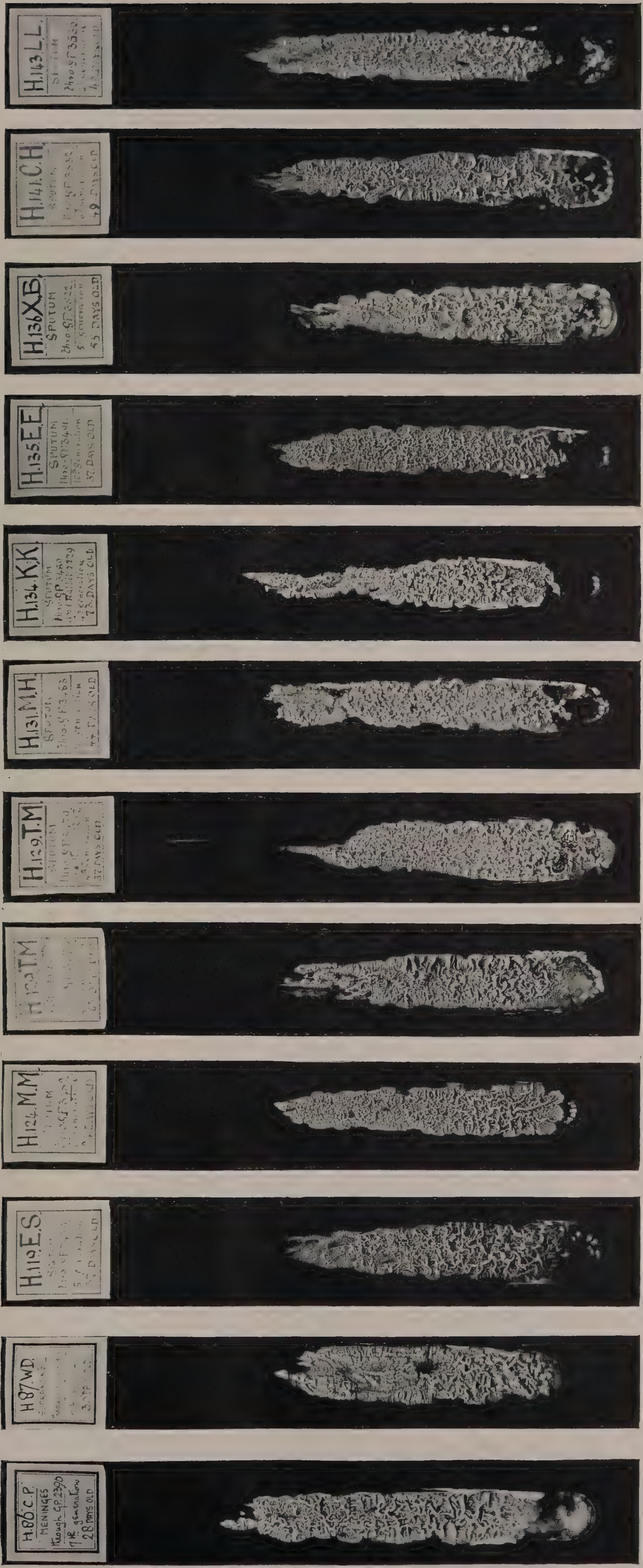
CULTURES OF BOVINE TUBERCLE BACILLI OF HUMAN ORIGIN (GROUP I) ON GLYCERIN AGAR.



CULTURES OF HUMAN TUBERCLE BACILLI (GROUP II) ON GLYCERIN AGAR.

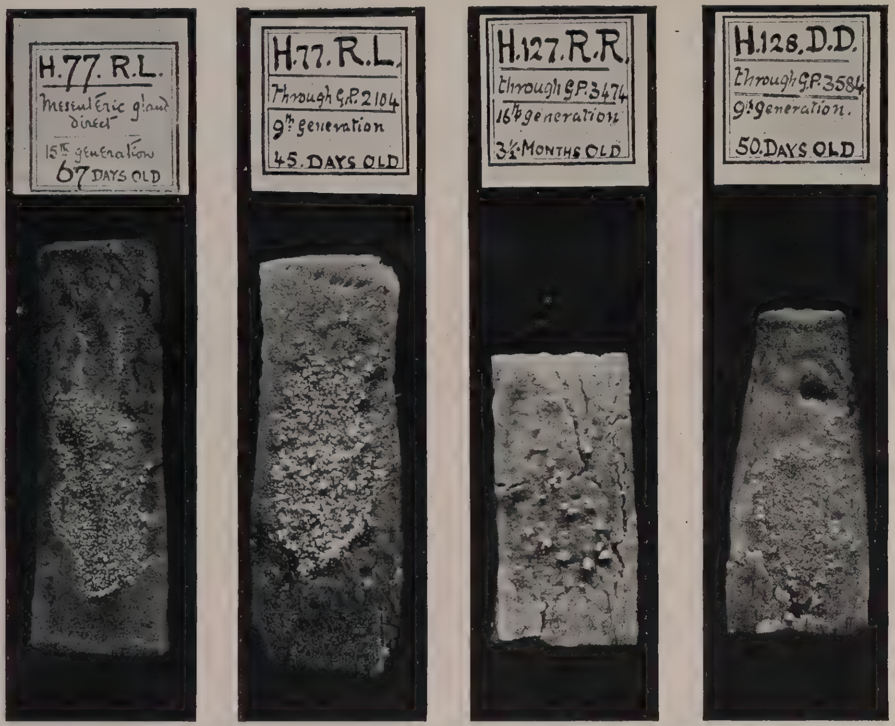
CULTURES OF HUMAN TUBERCLE BACILLI (GROUP II) ON GLYCERIN AGAR.



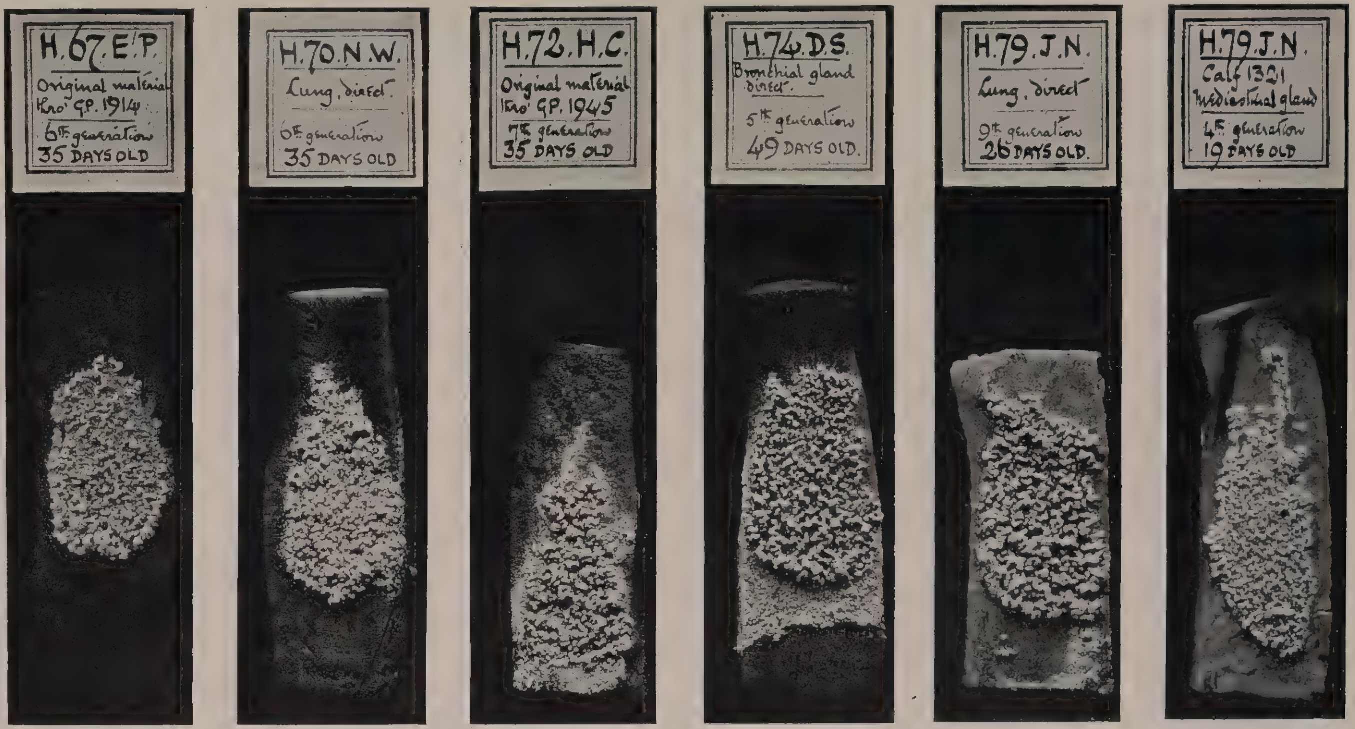


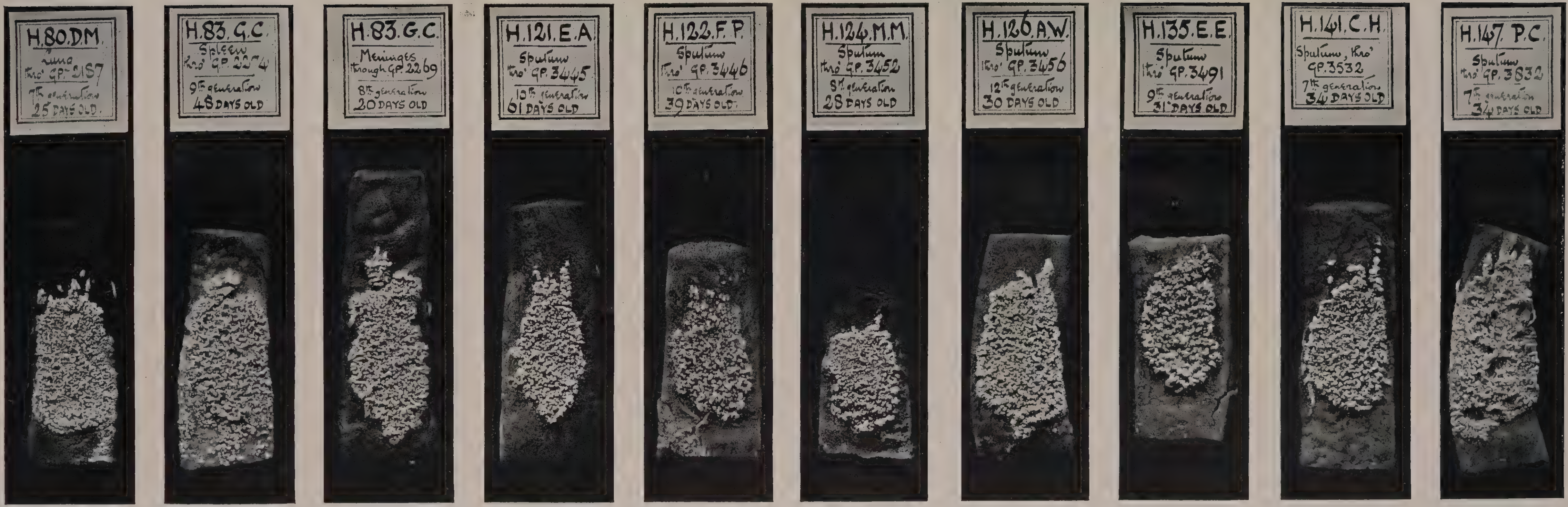
CULTURES OF HUMAN TUBERCLE BACILLI (GROUP II) ON GLYCERIN AGAR.

CULTURES OF BOVINE TUBERCLE BACILLI OF HUMAN ORIGIN (GROUP I) ON GLYCERINATED POTATO.



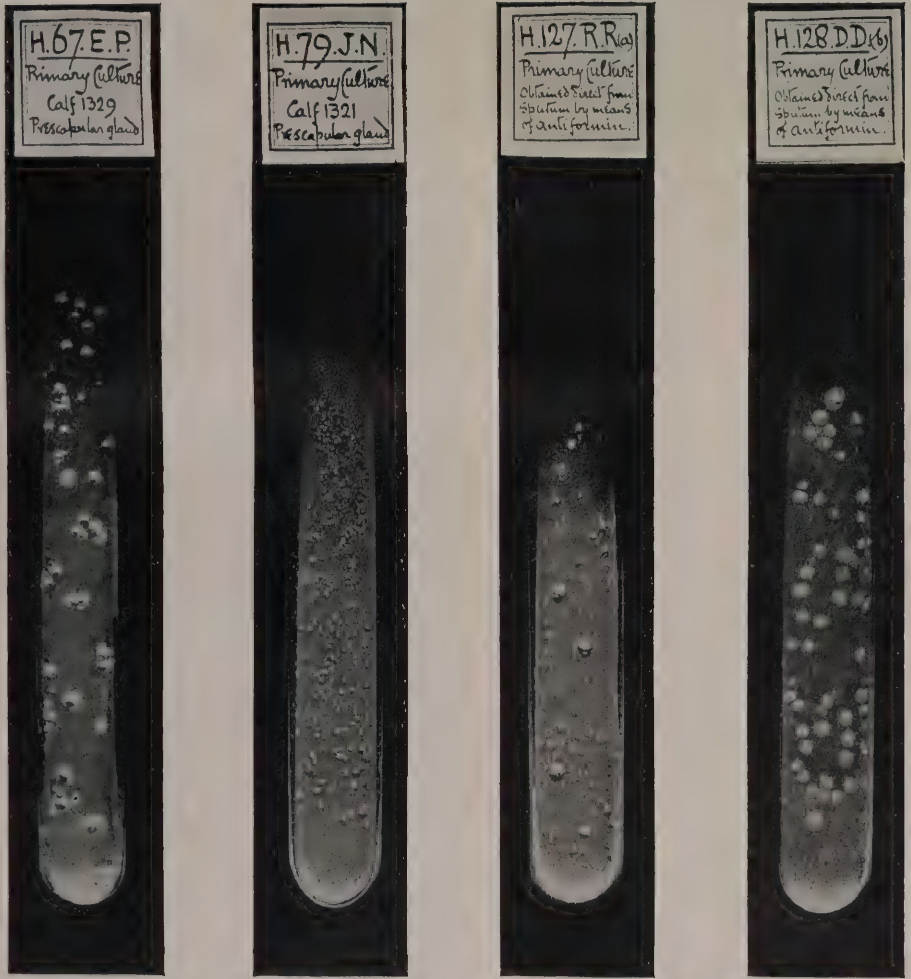
CULTURES OF HUMAN TUBERCLE BACILLI (GROUP II) ON GLYCERINATED POTATO.





CULTURES OF HUMAN TUBERCLE BACILLI (GROUP II) ON GLYCERINATED POTATO.

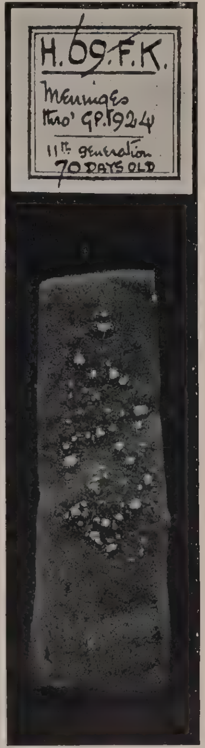
PRIMARY CULTURES OF TUBERCLE BACILLI ON THE EGG MEDIUM.



1. 2. 3. 4.

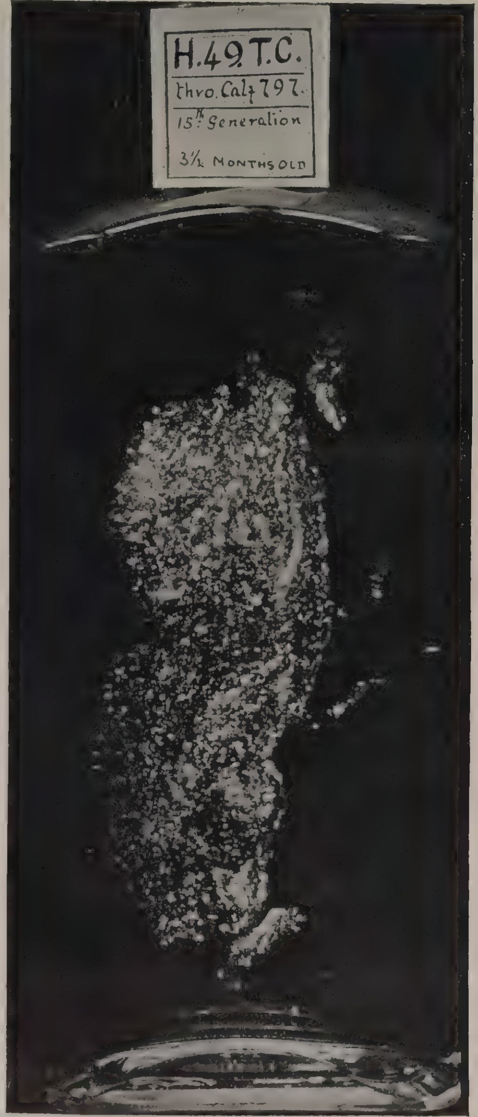
Nos. 1 and 2 of Human Tubercle Bacilli (Group II).
Nos. 3 and 4 of Bovine Tubercle Bacilli of Human Origin (Group I).

A SUBCULTURE OF A BOVINE TUBERCLE BACILLUS OF HUMAN ORIGIN ON GLYCERINATED POTATO (to supplement page 535).



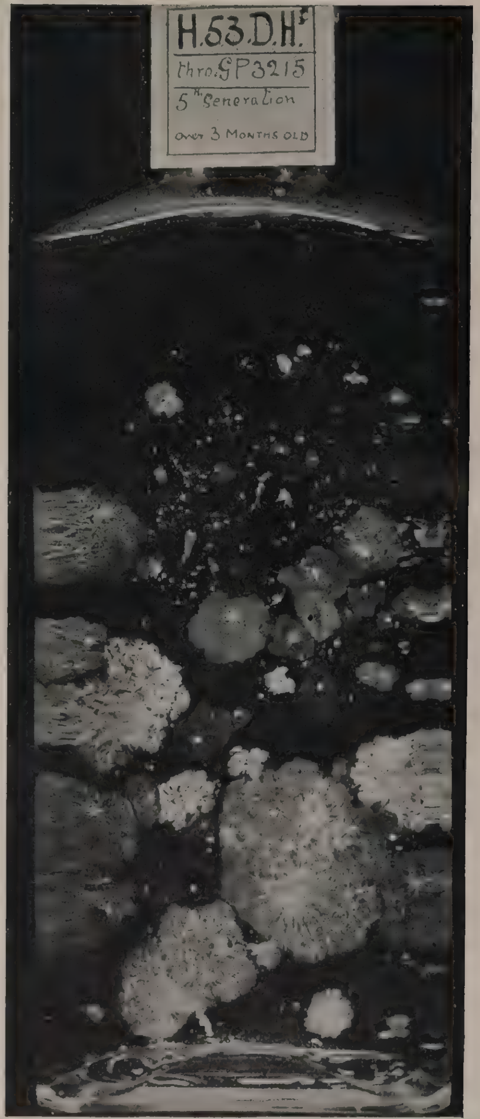
OF HUMAN ORIGIN

(for comparison with the growths produced by Human Tubercle Bacilli; *see* following Plate).



1.

1. Fully virulent for calves and rabbits.



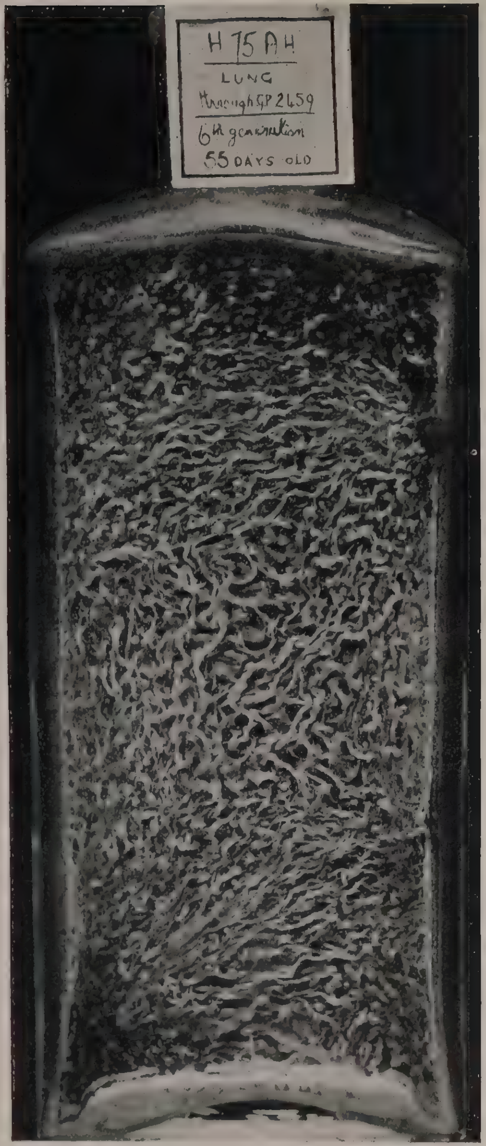
2.

2. Virulence intermediate for calves and rabbits

CULTURES OF HUMAN TUBERCLE BACILLI (GROUP II) ON GLYCERIN GELATIN (1 AND 3) AND GLYCERIN BROTH (2 AND 4).

The latter two cultures are grown according to the method devised by Dr. Eastwood.

1.



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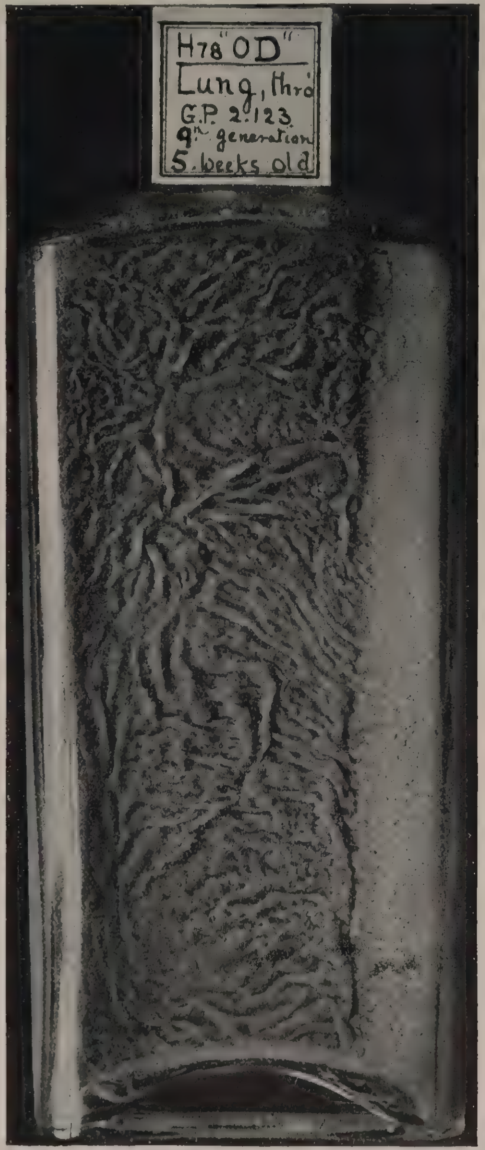

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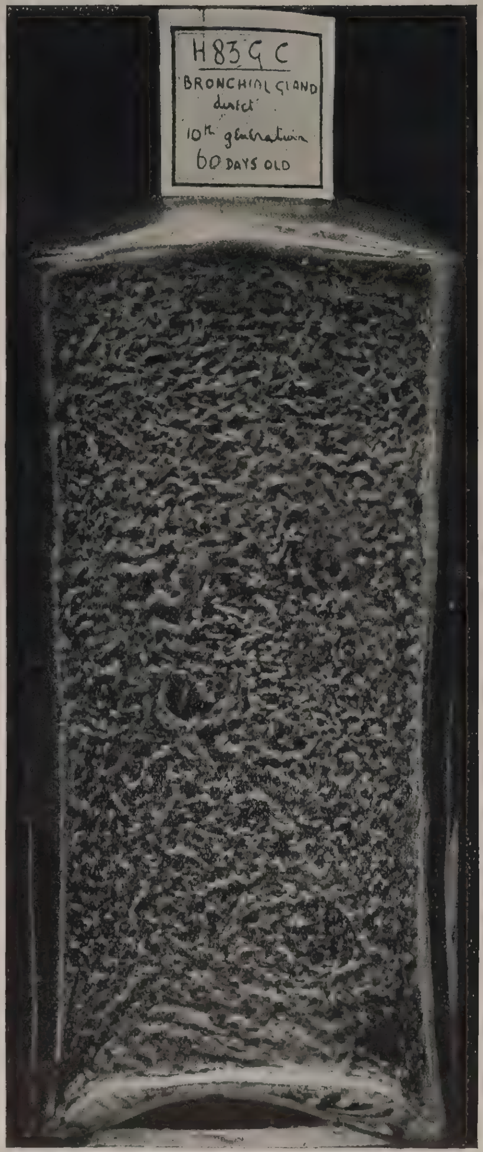

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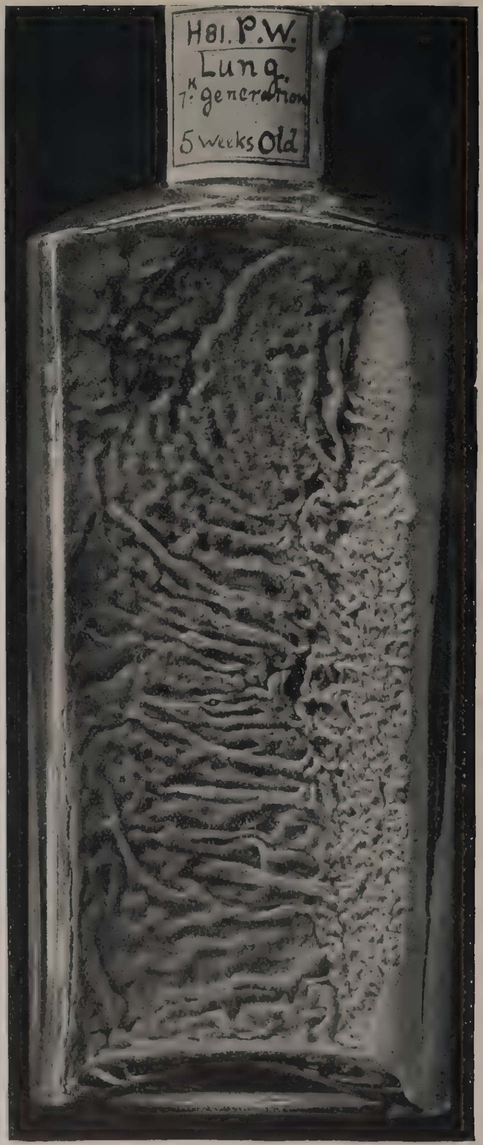

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